EOS Annual Meeting 2010 (EOSAM 2010)

26 - 29 October 2010, Parc Floral de Paris, France

ON-SITE PROGRAMME

EOSAM 2010 is held in conjunction with PRI-OPTO
26 - 28 October 2010

Sponsors

In cooperation with

TOM 7 is sponsored by

The Education Workshop is supported by
Publish your research

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> open access journal

> rapid publication

> professional peer-review

> publicity & international readership

> listed with ISI Journal Citation Reports

> individual author support

> reasonable publication rates

Regardless the length of the articles, the regular publication rates are:

350 € for EOS members*

400 € for non-members

* Associate members are requested to upgrade to a full membership first (12.50 €/year).
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<td>8:00-18:00</td>
<td>Attendees paying by cash are requested to bring the exact change in Euro.</td>
</tr>
<tr>
<td>Wednesday, 27 October</td>
<td>8:00-18:00</td>
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<tr>
<td>Thursday, 28 October</td>
<td>8:00-18:00</td>
<td>Payment receipts and confirmations of attendance will be available at the registration desk.</td>
</tr>
<tr>
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<td>8:30-16:00</td>
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REGISTRATION

For each accepted abstract, at least one author is requested to register properly. The registration for one Topical Meeting includes admission to all Topical Meetings held at EOSAM 2010 as well as to PRI-OPTO.

ORAL PRESENTATIONS

Time slots: Presenting authors are allotted 15 minutes (12 minutes presentation plus 3 minutes for discussion). Please plan your presentation accordingly to meet the 15 minute maximum.

Presentation upload: Speakers are requested to upload their presentation to the computer in the meeting room well in advance to their talk.

Presentation format: Please bring your presentation on a USB mass storage, CD-ROM or DVD and include all video files. File formats: ppt, pptx and pdf. A Windows-based presentation computer will be provided.

For Mac users: To make sure your presentation is displayed correctly, please:

- bring your presentation as pdf-file with fonts embedded or
- restrict yourself to Arial/Times New Roman (not Times)/Courier New (not Courier)/Symbol/Windings when creating your ppt- or pptx-file.

Technical equipment: All technical equipment (presentation computer, video projector, sound system, laser pointer) will be available on-site. It is not possible to use your personal laptop.

POSTER PRESENTATIONS

There will be two poster sessions during EOSAM 2010. Please see the programme (from page 76) to find out for which day your poster presentation is scheduled.

Poster authors are requested to be present at their posters during the official poster session. The poster set-up and removal is the responsibility of the authors only. Poster strips will be provided by the organisers. Important: Posters must be removed directly after the poster session.

Poster size maximum: A 0 (841 mm width x 1189 mm height)

Poster Session I: Wednesday, 27 October, 13:45 - 15:15, exhibition hall
Poster Session II: Thursday, 28 October, 13:30 - 15:00, exhibition hall

JOINT POST-DEADLINE SESSION

There will be taking place a joint post-deadline session for all topical meetings. Only a very limited number of was accepted for this session.

Date: Thursday, 28 October 2010 Time: 15:00 - 15:45 Room: Amphithéâtre Fresnel

BEST STUDENT PRESENTATION AWARDS

Best Student Poster Presentation
The best student posters presented at EOSAM 2010 will be awarded a diploma and a prize sponsored by the publisher Springer. All student poster contributions are eligible to the prize. The criteria for the award are relevance, originality, scientific merit and clarity.

Best Student Oral Presentation
The best student oral presentations at EOSAM will be awarded a diploma and a prize sponsored by the publisher Springer. All students giving an oral presentation are eligible to the prize. The criteria for the award are relevance, originality, scientific merit and clarity.

Notification to the Awardees
The winners of the Best Student Oral Presentation and Poster Presentation Award will be notified by the organisers directly after EOSAM 2010.

EOS WELCOME RECEPTION

Open to all attendees of EOSAM 2010.

Date: Tuesday, 26 October Time: 18:30 - 20:30 Room: Entrance area of PRI-OPTO
INFORMATION FOR AUTHORS AND ATTENDEES (continued)

EOS CONFERENCE DIGEST

The registration for EOSAM 2010 (except for the one-day registration) includes a digest CD-ROM with the abstracts of all presentations given at the EOS Annual Meeting 2010 (except for the workshop abstracts). The CD-ROM is ISBN numbered.

NOTE: A one-day registration does not include the digest CD-ROM. The digest may be purchased separately on-site at the registration desk.

The EOS does not publish conference proceedings with extensive papers. Authors who wish to publish in-depth papers are welcome to take advantage of the special publication offer for JEOS:RP (see next paragraph). The publication offer for JEOS:RP is an option but no obligation.

PAPER PUBLICATION IN JEOS:RP — SPECIAL OFFER

All attendees of the EOS Annual Meeting 2010 receive a 20% discount on the publication rate for JEOS:RP, the open access journal of the European Optical Society: Rapid Publications (www.jeos.org). The paper submitted to JEOS:RP must be an original contribution that is connected to one of the Topical Meetings and must be submitted no later than 14 January 2011.

Special rates:
- EOS members: 280 € (instead of 350 €)
- EOS non-members: 320 € (instead of 400 €)
Accompanying events

PRI-PHOTON RESEARCH INDUSTRY / OPTO

EOSAM 2010 will be held alongside PRI PHOTON Research Industry, the annual event on photonics issues and challenges taking place in France - a trade show of international stature. Energized by industry professionals, its objective is to stimulate networking and business and to enhance the visibility of the photonics industry and issues in a lively and convivial environment.

Several events and programmes will be taking place during 26 - 28 October:

P.6 OPTO (26 - 28 October)
The 30th edition of OPTO, the European tradeshow dedicated to all optics-photonics solutions, joins PRI in 2010. The OPTO 2010 exhibitors come from various fields including:

- Optical solutions for test, measurement and security
- Microscopy
- Spectroscopy
- Optical measurement instruments
- Sensors and detectors
- Imaging and displays
- Vision systems and components
- OEM optical and optoelectrical components
- Lasers and industrial laser systems
- Medical and scientific lasers
- LEDs
- Green photonics
- Nanotechnologies
- Biophotonics
- Materials
- Systems & components for telecoms
- Active components
- Ultra high-speed optical networks
- Materials and protocols for transmission
- Network installation materials
- Network test and measurement
- Network supervision
- Services

Annual Meeting of CNOP
The National Council on Optics and Photonics (FR) will hold its first Annual Meeting.

Competitions and awards
Vitrine de l’innovation is the annual ceremony for the award granted by the Photoniques magazine.

50 years of laser
PRI will host a number of industrial conferences and diverse activities dedicated to the 50th laser anniversary.

The opening hours of PRI (in particular for OPTO) are:
Tuesday, 26 October: 10:00 – 18:00 | Wednesday, 27 October: 09:00 – 18:00
Thursday, 28 October: 09:00 – 17:00

More information at: www.pri-event.org

LAB TOUR TO THE “LABORATOIRE CHARLES FABRY DE L’INSTITUT D’OPTIQUE”

The “Institut d’Optique Graduate School” is pleased to offer to all EOSAM 2010 attendees the visit of its laboratory, the “Laboratoire Charles Fabry de l’Institut d’Optique”. Pre-registration is required (free-of-charge). Contact: paris@myeos.org

Date: Monday, 25 October (one day before EOSAM 2010 starts) Time: 13:30 at the train station “RER B Massy-Palaiseau”

Getting there: Visitors will be picked up by bus at the train station “RER B Massy-Palaiseau” at 13:30 and will be released at the same station around 18:00. This is the fastest and easiest way to travel between the “Institut d’Optique”, Paris and the airports. More information will be sent to the registered visitors by email. The participation in the lab tour is free-of-charge.

EOS ANNUAL GENERAL MEETING

The EOS Annual General Meeting is open to all EOS members and attendees of EOSAM 2010.

Date: Wednesday, 27 October Time: 18:00 - 20:00 Room: Amphithéâtre Fresnel
EOS PRIZE AND FELLOWS CEREMONIES

At the beginning of the EOS General Meeting on Wednesday, 27 October (please see the previous paragraph), the EOS Prize winners from 2009 and 2010 will be awarded their prize and will give a short presentation of the highlights of their work.

Date: Wednesday, 27 October  
Time: 18:00 (during the Annual General Assembly)  
Room: Amphithéâtre Fresnel

EOS PRIZE WINNERS 2009

The EOS Prize 2009 is shared by

F. Sorrentino1, M. de Angelis1, A. Bertoldi1, L. Cacciapuoti1, A. Giorgini1, M. Prevedelli1, G. Rosi2, G.M. Tino2; 1Istituto di Ciberneticina CNR (IT); 2Laboratoire Charles Fabry de l’Institut d’Optique (FR); 3ESA Reasearch and Scientific Support Department (NL), “Dipartimento di Fisica, Università di Napoli (IT); 2Dipartimento di Chimica Fisica e Inorganica, Università di Bologna (IT); 4Dipartimento di Fisica “Enrico Fermi” (IT); 5Dipartimento di Fisica e LENS, Università di Firenze - INFN (IT),

for their contribution on “Precision measurements of gravity using cold atom sensor”

and

J. Clark1, L. Bazzano2, W.C. Tsoi2, R. Xia2, A.L. Mendonca2, A. Charas3, J. Cabanillas-Gonzalez1, T. Virgili1, L. Paracchini1, D.D.C. Bradley1, D.G. Lidzey2, J. Morgado3, A. Nocivelli1, G. Lanzani1; 1Politecnico di Milano, Dipartimento di Fisica and Istituto di Fotonica e Nanotecnologie - CNR (IT); 2UCB/Cat S.p.A. (IT); 3University of Sheffield, Physics Department (UK); 4Imperial College, Physics Department (UK); 5Instituto de Telecomunicaciones, and Departamento de Engenharia Quimica (PT),

for their contribution on “Ultrafast gain switching in conjugated polymer-doped Plastic Optical Fibers”

EOS PRIZE WINNER 2010

Self-imaging effect in multimode waveguides with longitudinal periodicity

S.F. Helfert, B. Huneke, J. Jahns; Fernuniversitaet in Hagen, Optical Information Technology (DE).

EOS FELLOWS

The EOS Prize Ceremony will be followed by the EOS Fellow Ceremony. The Society’s Fellows will be officially announced and will receive their fellowship diploma.

ICO PRIZE AND GALILEO GALILEI AWARD CEREMONIES

EOSAM 2010 will host the ICO Prize and Galileo Galilei Award Ceremonies including the awardees’ Ernst Abbe and Galileo Galilei lectures.

Date: Thursday, 28 October 2010  
Time: 17:30 - 19:45  
Room: Main hall

ICO Prize 2009

The ICO Prize 2009 goes to Rajesh Menon, Department of Electrical and Computer Engineering at the University of Utah and a 

affiliate of the Research Laboratory of Electronics at the Massachusetts Institute of Technology (MIT), for his “breakthrough achievement in nanolithography, in particular for his invention and development of the absorbance modulation method for a wider range of nanophotonic applications”.

Abstract

On breaking the Abbé diffraction limit in optical nanopatterning and nanoscopy

R. Menon

The Abbé diffraction limit prevents visible light from accessing the nanoscale. Recent advances in wavelength-selective photochemistry and wavefront engineering of light have begun to break this limit. Here, I will describe absorbance modulation and related techniques that enable optical nanopatterning and nanoscopy.

ICO Galileo Galilei Award 2009

The 2009 Award is shared by Marat S. Soskin (Institute of Physics of the National Academy of Sciences of Ukraine) “for his achievements in the fields of tunable lasers, dynamic holography, and linear and nonlinear singular optics”, and Dumitru Mihalache (Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest, Romania) “for his achievements in the field of theoretical nonlinear optics”.

Abstracts

Singular optics of carbon nanotubes dispersion in liquid crystals

M.S. Soskin

Fractal nanotubes clusters dispersed in nematic 5CB were investigated first by singular Stokes polarimetry. They induce optical vortices in the scattered laser light and polarization singularities in the passed laser beam refracted on the microns size inhomogeneous birefringent interfacial layers of 5CB surrounding nanotubes clusters.

Nonlinear optical modes in micro- and nanostructured media: From light bullets to plasmonic lattice solitons

D. Mihalache

I give an overview of recent results in the area of discrete-continuous light bullets propagating in one- and two-dimensional waveguide arrays. I also present the unique features of subwavelength plasmonic lattice solitons which form in arrays of metallic nanowires embedded in Kerr-type nonlinear media.

HOTEL LIST

The hotels listed below are located in the vicinity of the venue (Parc Floral de Paris) and in the Bastille quarter. The room rates (single occupation) are taken from the homepages of the listed hotels. Rates may vary according to room availability and reservation date. Please contact the hotel directly to make your reservation.

**** Hotels

Hotel Marceau Bastille ****
13, rue Jules César
75012 Paris
Tel.: +33 (0)1 43 43 11 65
Fax: +33 (0)1 43 41 67 70
E-mail: info@hotelmarceaubastille.com
URL: www.hotelmarceaubastille.com
Rates: from 150 €
Breakfast: 22 €
Remarks: Wi-Fi/WLAN free, near the Bastille a. Bois de Vincennes
Metro: lines M 1, 5, 8 Bastille; lines M 1,14 Gare de Lyon

Royal Regency ***
69-71, Rue Defrance
94300 Vincennes Paris
Tel.: +33 (0)1 49 57 12 00
Fax: +33 (0)1 43 65 76 61
E-mail: RoyalRegency@diamondresorts.com
URL: www.diamondresorts.com/Royal-Regency
Rates: from 79 €
Remarks: Wi-Fi/WLAN available; near the Castle of Vincennes, Parc Floral, Bois de Vincennes
Metro: line M 1, Château de Vincennes (850m)

Hotel Blason (Ex Continental) ***
30, Avenue de Paris, 1, rue de Montreuil
94300 Vincennes Paris
Tel.: +33 (0)1 419 318 62
URL: www.activehotels.com/1/1/2942165-hotel-blason-ex-continental-vincennes.html
Rates: from 50 €
Remarks: Wi-Fi/WLAN free of charge
Near the Castle of Vincennes, Parc Floral, Bois de Vincennes, RER A (station: Vincennes, 347m)
Metro: line M 1, Bérault (102 m)

Villa Beaumarchais ****
5, rue des Arquebusiers
75003 Paris, France
Tel.: +33 (0)1 40 29 14 00
Fax: +33 (0)1 40 29 14 01
E-mail: Beaumarchais@leshotelsdeparis.com
URL: www.villa-beaumarchais.com/
Remarks: Wi-Fi/WLAN
Rates: 150-300 €
Remarks: Wi-Fi available
Metro: lines M1, 5, Bastille or line M 8, Chemin-Vert

Daumesnil Vincennes***
50, Avenue de Paris
94300 Vincennes
Tel.: +33 (0)1 48 08 44 10
Fax: +33 (0)1 436 510 94
E-mail: info@hotel-daumesnil
URL: www.hotel-daumesnil.com/uk/
Rates: 89-199 €
Breakfast: 12 €
Remarks: Wi-Fi/WLAN available; near the Castle of Vincennes, Parc Floral, Bois de Vincennes
Metro: line M1, Château de Vincennes (400 m) or Bérault (290 m); line RER A, Vincennes

*** Hotels

Hotel Saint Louis - Best Western ***
2 bis, rue Robert Giraudineau
94300 Vincennes
Tel.: +33 (0)1 43 74 16 78
Fax: +33 (0)1 43 74 16 49
E-mail: saint-louis@paris-in.com
Rates: from 56 €
Remarks: Wi-Fi /WLAN
Near the Parc Floral de Paris, the Castle of Vincennes, RER Station (line A)
Metro: line M 1, Château de Vincennes (350 m)

Hotel Le Patio St Antoine Paris ***
289 bis, Rue Du Faubourg
75011 Paris
Tel.: +33 (0)1 40 09 40 00
Fax: +33 (0)1 40 09 11 55
E-mail: info@homeplazza.com
URL: www.homeplazza.com/fr/index.php
Rates: from 99 €
Breakfast: 18 €
Remarks: Wi-Fi/WLAN with charge; near the Bastille, Nation's Square and La Place des Vosges
Metro: lines M 1, 8, Reuilly-Diderot (350 m)

Hotel Turenne Le Marais ***
6, Rue De Turenne
75004 Paris
Tel.: +33 (0)1 42 78 43 25
Fax: +33 (0)1 42 74 10 72
E-mail: hotel@turennemarais.com
Rates: 115-200 €
Remarks: free internet access
Metro: line M 1, Saint Paul; lines M1, 5, 8, Bastille
HOTEL LIST

Hotel Novotel Paris Gare de Lyon***
2, Rue Hector Malot
75012 Paris
Tel.: +33 (0) 44 67 60 00
Fax: +33 (0) 44 67 60 60
E-mail: h1735@accor.com
URL: www.novotel.com/gb/hotel-1735-novotel-paris-gare-de-lyon/index.shtml
Rates: 119-259 €
Remarks: Wi-Fi available
Metro: lines M 1,14, RER A + D, Gare de Lyon (110 m)

** Hotels

Hotel du Château **
1, Rue Robert Giraudineau
94300 Vincennes
Tel.: +33 (0) 48 08 67 40
Fax: +33 (0) 43 28 73 27
E-mail: reservation@hotel-du-chateau.com
URL: www.hotel-du-chateau.com
Rates: 59-119 €
Breakfast: 7,9 €
Remarks: Wi-Fi /WLAN available; near the Castle of Vincennes, Parc Floral, Bois de Vincennes, RER line A (station: Vincennes)
Metro: line M 1, Château de Vincennes (400m)

Jardins **
39, Rue de Fontenay
94300 Vincennes
Tel.: +33 (0) 43 28 25 64
E-mail: hotellesjardins@wanadoo.fr
URL: http://hotellesjardins.free.fr
Rates: 58-85 €
Breakfast: 6 €
Remarks: Near the Castle of Vincennes, Parc Floral, Bois de Vincennes
Metro: line M 1, Château de Vincennes (400m); line RER A, Vincennes

Hotel Du Donjon-Vincennes **
22, Rue du Donjon
94300 Vincennes
Tel.: +33 (0) 43 28 28
Fax: +33 (0) 49 57
E-mail: info@hotel-du-donjon-vincennes.fr
Rates: 60-100 €
Breakfast: 7 €
Remarks: Wi-Fi /WLAN free of charge; near the Castle of Vincennes, Parc Floral, Bois de Vincennes
Metro: line M 1, Bérault or Château de Vincennes (350 m)

Hotel Charma **
14 bis, rue des Maraîchers
75020 Paris
Tel.: +33 (0) 1 43 72 51 96
Fax: +33 (0) 1 43 72 38 85
Mobile: + 33 6 60 99 25 86
E-mail: hotelcharma@free.fr
URL: www.hotelcharma.com/
Rates: 70-95 €
Breakfast: 6 €
Metro: line M 1, Porte de Vincennes (100 m), line M 9, Maraîchers (150 m)

Hotel Du Printemps **
80, Boulevard de Picpus
75012 Paris
Tel.: +33 (0) 1 43 43 62 31
Fax: +33 (0) 1 49 28 97 11
E-mail: contact@hotel-paris-printemps.com
URL: www.hotel-paris-printemps.com
Rates: 56-120 €
Remarks: Wi-Fi/WLAN available
Metro: lines M 1, 2, 6, 9, RER A, Nation (100 m) or line 6, Picpus

Hostels/Student accommodations

CISP - Centre International Maurice Ravel
6, Avenue Maurice Ravel
75012 Paris
Tel.: +33 (0) 1 43 58 96 00
Fax: +33 (0) 1 43 58 95 12
E-mail: reservation@cisp.fr
URL: www.cisp.fr
Rates: 19.90 - 40.30 €
Breakfast: included
Remarks: Wi-Fi free of charge in the foyer
Metro: line M1, Porte de Vincennes (10 minutes walk); line M 6, Bel-Air; ligne M 8, Porte Dorée

Hostelworld - hostel booking website
www.hostelworld.com/hostels/Paris
GETTING TO PARIS

Paris is easy to reach from many places in the world - be it by air, train or car. Useful information you will find in the Paris Travel Kit (download: www.ratp.info/orienter/interface/plans_etHoraires.php?methode=affiche_pdf&loc=touristes&nompdf=paris_tourisme&file=pdf&lang=fr&partenaire=ratp.pdf-file 1.7 MB), or you contact the Paris tourist office at tel. +33 (0) 892 68 3112 or via www.parisinfo.com.

**BY AIR**

Paris has three airports that can be reached by direct connections from various airports in the world. All three airports are within easy reach of Paris.

- Paris-Charles de Gaulle (CDG)
- Paris-Orly (ORY)
- Paris-Beauvais (BVA)

For more information about how to get to Paris by air please visit http://en.parisinfo.com/paris-map/arrivals-departures/by-air/guide/by-air_your-arrival-at-the-airport.

**BY TRAIN**

Paris has seven major train stations that can be reached within few hours from all major European cities. Each train station offers connections with the public transport network (metro, RER, bus).

- Gare du Nord
- Gare de l’Est
- Gare de Lyon
- Gare de Bercy
- Gare d’Austerlitz
- Gare Montparnasse
- Gare Saint-Lazare

For more information about how to get to Paris by train please visit http://en.parisinfo.com/paris-map/arrivals-departures/by-train/guide/by-train_your-arrival-by-train.

**BY CAR**

Depending on from where you come in, you can join the “Périphérique” (ring road) at one of its 30 “portes” (gateways). Paris has two ring roads the “périphérique extérieur” (outer ring road) and the “périphérique intérieur” (inner ring road).

For more information about how to get to Paris by car and about the French motorway system and tolls please visit http://en.parisinfo.com/paris-map/arrivals-departures/by-car/guide/by-car_motorway-system-and-tolls.

THE VENUE: PARC FLORAL DE PARIS

EOSAM 2010 will be held at Parc Floral de Paris (www.parcfloraldeparis.com) - a unique setting where the bustle of Paris meets the wonders of nature. Parc Floral de Paris is situated in the heart of the Bois de Vincennes, where legend has it Saint-Louis meted out justice from beneath his oak tree. The castle, its dungeon and ramparts bear witness to over ten centuries of history. Parc Floral is only 20 minutes from the city centre.

Parc Floral de Paris
Esplanade du Château de Vincennes
"Pyramide" Entrance
Route de la Pyramide
75012 PARIS

There is a free car park close to the venue.
GETTING THERE

On foot, by car, bicycle, bus or subway...accessibility is one of the great features of Parc Floral de Paris. The event centre provides you with everything you need (shuttles, free visitor parking....).

**From the airport**

**From Charles de Gaulle Airport:**
- Take RER Line B, direction "Massy-Palaiseau", and exit at „Châtelet Les Halles”.
- At „Châtelet Les Halles” change to Metro Line 1, direction „Château de Vincennes” and exit at „Château de Vincennes”.
- Duration: ~ 1 hour.

**From Orly Airport:**
- Take the Metro Line „Orly Val”, direction „Antony”, and exit at „Antony”.
- At „Antony” change to RER B, direction „Aeroport Charles de Gaulle 2 TGV”, and exit at „Châtelet Les Halles”.
- At „Châtelet Les Halles” you may either
  - change to RER A, direction „Boissy-Saint-Leger”, and exit at „Nation” and there change to Metro Line 1 direction „Château de Vincennes” and exit at „Château de Vincennes”.
  - or you walk to „Châtelet” (4 min.) and take the Metro Line 1, direction „Château de Vincennes” and exit at „Château de Vincennes”.
- Duration: ~ 1 hour.

For more information about ground transport between Paris and the airports, see
- [www.conciergerie.com](http://www.conciergerie.com) - Practical information - Arriving in Paris / Departing Paris

**Public transport**

Parc Floral de Paris is easy to reach by the RER, Metro and bus lines. Paris public transport is operated by the RATP and includes the metro subway system, RER trains, busses, night busses, Montmartre bus, and the Montmartre funicular railway, all of which accept the same tickets and passes (except see RER Trains). You can purchase individual tickets, booklets of ten tickets, or Paris Visite passes ([www.conciergerie.com/paris_metro_pass.htm](http://www.conciergerie.com/paris_metro_pass.htm)) designed expressly for visitors and offering unlimited travel.

- RER Line A, station “Vincennes”
- RER Line B to station “Châtelet Les Halles”, change to Metro line 1 station “Château de Vincennes”
- Metro: Line 1, station “Château de Vincennes”
- Bus Line 112 stop “Stade Leo Lagrange”

For public transport timetables and itineraries please see: [www.ratp.fr](http://www.ratp.fr).

**Taxis**
- G7: +33 (0) 147 3947 39
- Taxis bleus: +33 (0) 149 36 1010
- Borne Taxis Vincennes: +33 (0) 148 08 0000

**Getting there by car**
- 5 minutes from the Peripherique (Porte Dorée/Vincennes/de Charenton)
- 5 minutes from the A4 motorway, Joinville exit

**BUS SHUTTLE SERVICE**

A shuttle service from the metro station "Chateau de Vincennes" to Parc Floral is arranged.

The shuttle busses wait at the "Chateau de Vincennes" metro station exit and depart every 8-10 minutes between:
- 7:30 – 12:00
- 16:00 – 20:00

For public transport timetables and itineraries please see: [www.ratp.fr](http://www.ratp.fr)

**Notes**
Accommodation, travel & venue

HALL PLAN

- **TOM 1: BIOPHOTONICS - ADVANCED TRAPPING AND OPTOFLUIDICS IN LIFE SCIENCES**
  26 & 27 October: Maiman
  28 October: Lippmann

- **TOM 2: TERAHERTZ SCIENCE AND TECHNOLOGY**
  26 - 29 October: Michelson

- **TOM 3: NANOPHOTONICS AND METAMATERIALS**
  26 - 29 October: Foucault

- **TOM 4: MICRO-OPTICS**
  26 - 29 October: Newton

- **TOM 5: ORGANIC PHOTONICS**
  26 - 28 October: Huygens

- **TOM 6: NONLINEAR OPTICS AND PHOTONICS**
  26 - 29 October: Amphithéâtre Fresnel

- **TOM 7: ICO/EOS TOM ON OPTICS & ENERGY**
  28 - 29 October: Maiman

- **WORKSHOP ON ENTREPRENEURSHIP AND BUSINESS INNOVATION IN PHD EDUCATION**
  29 October: Lippmann

- **PLENARY SESSIONS**
  26 - 29 October: Amphithéâtre Fresnel

- **JOINT POST-DEADLINE SESSION**
  28 October: Amphithéâtre Fresnel

- **GRAND CHALLENGES OF PHOTONICS**
  27 October: Amphithéâtre Fresnel

Notes:
FOREWORD BY THE GENERAL CHAIR

Dear attendees of EOSAM 2010,

Welcome to the Scientific Annual Meeting of the EOS in Paris! The third edition of this bi-annual event is again a great opportunity to meet and exchange information with your colleagues from the optics and photonics community. EOSAM 2010 will be held alongside PRI PHOTON Research Industry, the annual event on photonics issues and challenges taking place in France, and OPTO, a trade show of international stature.

Large international conferences in a big city are often held in a business-oriented impersonal environment. This time, we can offer you not only outstanding presentations, but also a great location. Parc Floral de Paris is situated in the heart of the Bois de Vincennes, and is world-renowned for its exceptional floral collections of over 3,000 plants. It is a privileged environment for discovery and heavenly promenades, not only for scientists thinking about green photonics.

EOSAM 2010 is organised in seven topical meetings (TOM 1 – 7), giving a broad overview of contemporary optics and photonics, from basic phenomena to highly innovative applied research: Biophotonics – Advanced Trapping and Optofluidics in Life Sciences; Terahertz Science and Technology; Nanophotonics and Metamaterials; Micro-Optics; Organic Photonics; Nonlinear Optics and Photonics and Optics and Energy, a Topical Meeting organised in collaboration between EOS and ICO – the International Commission for Optics. Also, be sure to attend the Workshop on Entrepreneurship and Business Innovation in PhD Education and as a dessert the Grand Challenges of Photonics.

EOSAM 2010 will be opened by the Head of the Photonics Unit of the European Commission, Thomas Skordas, who will illustrate the prospects and potentials of Photonics in Europe. The seven plenary speakers will offer an overview of the latest developments and trends in the fields addressed by all topical meetings. Nonlinear optics, resonance phenomena, the interaction of photons with electrons, terahertz dynamics and optofluidics as systems concept, will be addressed. Promising titles, such as “Is this the beginning of a new age in green photonics” invite to join the future. The plenary talks start late in the morning, giving late risers a chance to attend the highlights.

For the second time, EOS will dedicate a special session to the Grand Challenges of Photonics, focusing on the fantastic capabilities of photonics and the science of light. I don’t want to say more about it here. Discover, learn and enjoy!

To conclude, I would like to express my gratitude to the Chairs of all topical meetings and workshops, who have worked really hard to prepare a stimulating scientific program, and to the EOS Office, that has taken care of all the organisational work.

I look forward to welcoming you in Paris, and I wish you a fruitful and exciting EOS Annual Meeting.

Hans Peter Herzig
General Chair EOS Annual Meeting 2010
EOS President, CH

ORGANISING COMMITTEE

Hervé Lefèvre
Vice-Chair EOSAM 2010, EOS President Elect, FR

Slike Kramprich
European Optical Society (EOS), DE

Judith Oumard
European Optical Society (EOS), DE
EOSAM 2010 overview

TOM 1: Biophotonics - Advanced Trapping and Optofluidics in Life Sciences

As we approach the fiftieth anniversary of the laser, we find seminal applications of photonics at the microscale making an ever growing impact. Light may exert forces on biological material. This field of optical trapping or micromanipulation enhances our fundamental knowledge across the sciences, highlighting our understanding of (nano-scale) molecular motors, unravelling the mechanics of DNA and cells, and making a great impact on studies of soft condensed matter and hydrodynamic interactions. Biological studies of single molecules have been revolutionised and new applications continue to appear: for example optical trapping combined with imaging (e.g., Raman) or other photonics technologies (e.g. nanosurgery) enhancing the ever growing “optical toolkit”. In the broader remit integrating optical methodologies with microfluidics is a current 'hot' topic in the field and indeed may be seen part of the exciting emergent area of optofluidics which combines microfluidics and photonics with particular emphasis on biological applications. Microfluidics is ideal for controlled sample delivery and advanced photonics for sensing or imaging thus leading to real innovation in analysis and future potential for integration. Such methodologies are highly reconfigurable offering advantages for manipulating, imaging, treating and handling of biological and colloidal samples.

Biophotonics - Advanced Trapping and Optofluidics in Life Sciences aims at exploring the exciting marriage of optical techniques and microfluidics with an emphasis upon the topics of optofluidics and optical trapping.

Plenary speaker

Optofluidics
Demetri Psaltis
École Polytechnique Fédérale de Lausanne - EPFL, CH

Invited speakers

Femtosecond laser surgery on a chip for nerve regeneration
Adela Ben-Yakar
University of Texas at Austin, US

Laser-based nanotechnologies for biomedical applications
Boris Chichkov
Laser Zentrum Hannover e.V., DE

Optical tools and techniques for studying behavior and neuronal regeneration in the roundworm C. elegans
Samuel Chung
Boston University, US

Wide field supercritical angle fluorescence microscopy
Emmanuel Fort
University Paris Diderot, FR

Plasmon nano-optics for biosciences: sensing, trapping and hyperthermia
Roman Quidant
Institute of Photronics Sciences - ICFO, ES

Optical integration for microfluidic systems
James Wilkinson
University of Southampton, UK
TOM 2: Terahertz Science and Technology

The field of THz Science and Technology is growing at a tremendous speed, as evidenced by the exponentially increasing number of publications in this field and by the strongly increasing number of patents and applications.

This topical meeting provides a platform on which the latest results in the generation, detection and use of THz radiation in science and technology can be presented and discussed. The meeting is for senior scientists and (under)graduate students alike. There will be two 45 minute-long Masterclasses, especially aimed at the undergraduate/graduate student level.

Plenary speaker
Terahertz Dynamics of Condensed Matter: from the quantum limit to ultrahigh fields
Alfred Lietenstorfer
University of Konstanz, DE

Master class speakers
Terahertz metamaterials: recent developments and new opportunities
Richard Averitt
Boston University, US

THz Imaging systems
Hartmut Roskos
Johann Wolfgang Goethe-University, DE

Invited speakers
Terahertz measurements of the peptide dynamical transition
Andrea Markelz
State University of New York at Buffalo, US

300-GHz-band wireless link based on photonic signal generation
Tadao Nagatsuma
Osaka University, JP

THz systems based on 1.55 µm telecom technologies
Bernd Sartorius
Fraunhofer Institute for Telecommunications - Heinrich-Hertz-Institute, DE

Quantum cascade laser based terahertz amplifiers
Jerome Tignon
Ecole Normale Superieure, FR

Sessions
- THz metamaterials
- THz generation and modulation
- THz imaging I - near and far-field imaging
- THz quantum cascade lasers
- THz imaging II - far-field imaging
- THz spectroscopy of organic and biological material
- THz spectroscopy techniques and tools
- THz solid-state spectroscopy
- THz systems and facilities
TOM 3: Nanophotonics and Metamaterials

Both nanophotonics and metamaterials rely on our understanding of light-matter interaction on the nanoscale. Recent developments in this broad field are based on nanostructured dielectrics, semiconductors and metals and lead to applications and devices in which electromagnetic field can be generated, manipulated and controlled in sub-wavelength structures. Nanophotonics and metamaterials pave the way to many novel applications in various technological areas spanning from biosensing and high-resolution imaging to datacomm and energy harvesting.

This topical meeting will cover all experimental and theoretical aspects of light interaction with nanoscale objects and nanostructured materials, new optical properties of nanostructured matter and their applications.

Plenary speaker

Trends in nanoplasmonics: smaller, faster, stronger
Mark I. Stockman
Georgia State University, US

Invited speakers

Nanoplasmonic enhancement of light–matter interaction
Sergey Gaponenko
National Academy of Sciences of Belarus, BY

High-resolution optical microscopy of nanotubes and nanowires
Achim Hartschuh
Ludwig-Maximilians-Universität München, DE

Nanoscale light control
Kobus Kulpers
FOM Institute for Atomic and Molecular Physics (AMOLF), NL

Photonic crystal nanobeam cavities
Marko Lončar
Harvard University, US

Amorphous metamaterials
Carsten Rockstuhl
Friedrich-Schiller-Universität Jena, DE

Theory and plasmons: going beyond conventional classical electrodynamics
George Schatz
Northwestern University, US

Plenary speaker

Trends in nanoplasmonics: smaller, faster, stronger
Mark I. Stockman
Georgia State University, US

Invited speakers

Nanoplasmonic enhancement of light–matter interaction
Sergey Gaponenko
National Academy of Sciences of Belarus, BY

High-resolution optical microscopy of nanotubes and nanowires
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Harvard University, US

Amorphous metamaterials
Carsten Rockstuhl
Friedrich-Schiller-Universität Jena, DE

Theory and plasmons: going beyond conventional classical electrodynamics
George Schatz
Northwestern University, US
TOM 4: Micro-Optics

This topical meeting is intended to provide an international forum for an update, review and exchange of scientific and technical breakthroughs and information covering a wide range of topics within the field of micro-optics, from fundamental theory and research to applications and systems.

Plenary speaker

Resonance waveguide gratings
Markku Kuittinen
University of Eastern Finland, FI

Invited speakers

Laser beam shaping by active GRIN media
Teresa Flores-Arias
University of Santiago de Compostela, ES

Real-time non-invasive identification of micro/nano organisms using 3D computational imaging
Bahram Javidi
University of Connecticut, US

Optical coherence tomography in medicine and art conservation
Andrzej Kowalczyk
Nicolaus Copernicus University, PL

Optimal fabrication techniques for digital micro-optics
Bernard Kress
USI Inc., Photonics Division, US

Micro-optical sources for quantum communication in space
Valerio Pruneri
Institut de Ciències Fotòniques - ICFO, ES

Micro-optics system and SPAD array detectors for parallel photon timing applications
Ivan Rech
Politecnico di Milano, IT

Micro-optics: Key Enabling Technology (KET) for advanced mask aligner lithography
Reinhard Voelkel
SUSS MicroOptics, CH

Polarisation sensitive nanostructured micro-optics
Andrew John Waddie
Heriot-Watt University, UK

Photonic metamaterials
Martin Wegener
Karlsruhe Institute of Technology, DE

Chairs

Mohammad R. Taghizadeh
Heriot-Watt University, UK

Norbert Lindlein
University of Erlangen-Nürnberg, DE

Programme committee

Ryszard Buczynski
University of Warsaw, PL

Carlos Gómez-Reino Carnota
Universidad de Santiago de Compostela, ES

Zbigniew Jaroszewicz
Institute of Applied Optics, PL

Lifeng Li
Tsinghua University, CN

Fredrik Nikolajeff
Uppsala University, SE

Heidi Ottevaere
Vrije Universiteit Brussel - VUB, BE

Olivier Parriaux
Université de Saint Etienne - Jean Monnet, FR

Stefano Pelli
Istituto di Fisica Applicata (IFAC-CNR), IT

Stefan Sinzinger
Technische Universität Ilmenau, DE

Hans Zappe
University of Freiburg, DE

Uwe D. Zeitner
Fraunhofer Institute for Applied Optics and Precision Engineering, DE

Sessions

- Diffraction and holographic structures
- Sub-wavelength and polarization sensitive micro-optics
- Fabrication methods
- Micro-optics for fabrication, measurement and interferometry I
- Micro-optics for fabrication, measurement and interferometry II
- Biological applications
- Active micro-optics & lasers
- Simulation and theory
- Gradient index and guided optics
Organic semiconductors are a broad class of materials comprising small molecules, conjugated polymers and carbon based nanostructures (e.g. carbon nanotubes), which can play a role in photonics. They all have in common p-electron delocalization, in low dimensional space, which yields a number of interesting properties for photonics such as large optical cross-sections and short response time, large nonlinear optical responses, energy and charge transport together with mechanical qualities (film formation, deposition, high damage threshold, low cost technology). In addition the interaction of organic with inorganic semiconductors leads to new and promising functions which appear in hybrid systems and devices.

TOM 5 aims at providing a state-of-art review on organic and hybrid photonics, incl. its fundamentals, potentiality and applications. The program format allows for open discussion among participants and fruitful exchange of experience.

**Plenary speaker**

**Molecular control for organic photonics**

Donal D.C. Bradley  
Imperial College London, UK

**Invited speakers**

**A targeted review of hybrid integrated photonics**

Bruno Bêche  
Université de Rennes I, FR

**High-speed signal processing with silicon-organic hybrid devices**

Wolfgang Freude  
Karlsruhe Institute of Technology (KIT), DE

**FRET optoelectronics**

Pavlos Lagoudakis  
University of Southampton, UK

**Insights on diffraction by a dielectric wedge from polymer-based micro-lasers**

Melanie Lebental  
ENS de Cachan, FR

**Photogeneration and ultrafast dynamics of excitons and charges in polymer/fullerene/quantum dot blend films**

Laurens D. A. Stebbelis  
Delft University of Technology, NL

**Fabrication of active and functional organic photonic crystal templates using holographic lithography**

Kam Sing Wong  
The Hong Kong University of Science and Technology, CN
TOM 6: Nonlinear Optics and Photonics

The Topical Meeting on Nonlinear Optics and Photonics will address both the fundamentals and applications of modern nonlinear optics from a broad range of viewpoints, including several presentations on spatial and spatiotemporal dynamics, nonlinear pulse propagation, nano- and microstructured materials, novel nonlinear sources, as well as nonlinear microscopy and spectroscopy.

The program will consist of a plenary talk, seven invited talks, around 40 contributed talks, and 34 posters. We are very pleased to have as the plenary speaker Prof. Yuen-Ron Shen (University of California, Berkeley), one of the pioneers of the whole field of nonlinear optics, who will review the history and present state-of-the-art of nonlinear optics. Invited talks highlight several recent milestone contributions to the field, including plasmonic high-harmonic generation, nematicons, rogue waves and pulse self-compression in supercontinua, light-induced transverse magnetism, and the rapidly developing field of silicon waveguide optics, featuring comb generation with cw sources as well as solitonic supermodes. Finally, contributed talks provide a broad overview of the current development, ranging from chaos, nonlinear dynamics, nano- and microstructures, and quantum effects to applications in biology, imaging, and for pulse generation.

We look forward to meeting you in Paris. Martti Kauranen and Günter Steinmeyer

Plenary speaker

Historical perspective of nonlinear optics
Yuen-Ron Shen
University of California - Berkeley, US

Invited speakers

Nematicons: self-steering self-confined light beams in liquid crystals
Gaetano Assanto
Università di Roma Tre, IT

Solitonic supermodes and resonant radiation in subwavelength silicon-on-insulator
Andrey Gorbach
University of Bath, Department of Physics, UK

High harmonic generation by plasmonic resonance field enhancement
Seungchul Kim
KAIST Institute of Science and Technology, KR

Octave-spanning tunable frequency combs on a chip
Tobias Kippenberg
Max Planck Institute of Quantum Optics, DE

Intense coherent transverse magnetism induced by light - experiments and theory
Steve Rand
University of Michigan, US

Self-compression of ultrashort laser pulses
Stefan Skupin
Max Planck Institute for the Physics of Complex Systems, DE

Optical rogue waves: extreme events in supercontinuum generation
Daniel Solli
University of California - UCLA, US
The 21st century is the century of photonics and of the revolution triggered by energy resources. Sustainable technologies based upon optics and photonics picture a challenging future. These new technologies, adequately located inside devices for energy production, involve fundamental aspects of physics such as interaction of matter with radiation, with particular emphasis on photon optics, physical properties of materials in the optical band, the physics of semiconductors and new photo-materials, among other relevant subjects. Those fundamental issues concern basic physical processes such as the photovoltaic effect, currently revisited for new flexible designs and devices. The related new emerging technologies contemplate topics such as silicon photonics, structures for the harvesting of light, solar energy, design and fabrication of optical elements with high optical performances, such as photovoltaic concentrators. This is indeed a short sketch of the vast field involving optics and energy, covered in the core lectures of the forum.

There is in addition another interpretation of the subjects mentioned. Global economy is facing as well a period of challenges and scientists are urged to provide answers and initiatives by facilitating the feasibility of a wide dissemination of new sustainable energy transfer of technology. In this challenge, no restrictions apply, and both developed and developing societies may share the new future as ensuring a better quality of life.

The International Commission for Optics has as main objective the support for the dissemination of optics and photonics all over the world. This new venture with the European Optical Society, as one part of the international societies partners inside ICO, will offer, for the first time, a forum addressed to scientists, young researchers, technicians, and in general, to all those interested in this new field of current impact and strong development.

### Plenary speaker

**Is this the beginning of a new age in green photonics?**

**Michael Lebby**

Translucent Inc., US

### Invited speakers

**Subwavelength photonics: A new waveguide principle for highly efficient planar waveguide components**

**Pavel Cheben**

National Research Council of Canada, CA

**Rare earth doped glasses as down-converters to improve Si-based solar cell efficiency**

**Maurizio Ferrari**

CNR-IFN, Istituto di Fotonica e Nanotecnologie, IT

**Increased performance of thin film silicon photovoltaic modules through optical confinement strategies**

**Marta Fonrodona**

T-Solar, Barcelona, ES

**Ultrafast all-optical signal processing how and why?**

**Ivan Glesk**

University of Strathclyde, Scotland, UK

**Improved photovoltaic performances of heterostructured tetrapod-shaped CdSe/CdTe nanocrystals using C60**

**Giuseppe Gigli**

University of Salento, NNL, IT

### Technology drivers for an acceleration of PV development

**Jean-Pierre Joly**

Institut National de l’Energie Solaire, FR

### Novel nonimaging designs of compact optics with the SMS method

**Juan Carlos Miñano**

Universidad Politécnica de Madrid (UPM), ES

### Plenary speaker

**Is this the beginning of a new age in green photonics?**

**Michael Lebby**

Translucent Inc., US

### Programme committee

**Pavel Cheben**

National Research Council Canada, CA

**Anna Consortini**

University of Florence, IT

**Milcho Danailov**

Sincrotrone-Trieste, IT

**Marta de la Fuente**

Indra Sistemas S.A., ES

**Ivan Glesk**

University of Strathclyde, UK

**Michael Grestzal**

École Polytechnique de Louanne - EPFL, CH

**Angela M. Guzman**

Florida Atlantic University, US

**Jean-Pierre Huignard**

Consultant in Photonics, FR

**Michael Lebby**

Translucent Inc., US

**Humberto Michinel Álvarez**

Universidade de Vigo, ES

### Sessions

- Photonics for solar energy
- New advanced photovoltaic devices
- Optical design and processing for photovoltaic concentrators
- Novel technologies for high performance solar concentrators
Workshop on Entrepreneurship and Business Innovation in PhD Education

The main focus of PhD study is scholarly research. The endpoint is a Thesis that describes original research, showing some degree of innovation and/or a critical analysis of a particular research topic. According to the formalities of the Bologna agreement, PhD study is a three-year activity, although through Europe the actual time taken to reach the required level is almost always longer (probably closer to 3.5 to 4 years).

Against this background, there are pressures on PhD course organisers and supervisors to provide additional professional education as an integrated part of the PhD. One topic that is particularly prominent at present is the desire to instil a sense of entrepreneurship and business innovation into the PhD.

This Workshop focuses on the issues involved in integrating ideas of entrepreneurship and business innovation into PhDs in optics and photonics.

Keynote speaker
Entrepreneurship for scientists and engineers
Duncan Moore
University of Rochester, US

Invited speakers
Involving doctoral students in the innovation-entrepreneurship study track at Institut d’Optique
Frédéric Capmas
Institut d’Optique, FR

Embedded business development in academic photonics research
Danae Delbeke
Ghent University, BE

Introductory talk
Hervé Lefèvre
IXCore S.A.S., FR

From PhD to CEO?
Michel Mariton
Horiba Jobin Yvon, FR

Case study: creating and sustaining an entrepreneurial research environment at the applied optics group @ NUI Galway
Una Murphy
National University of Ireland, IE

Chairs
Pierre Chavel
Institut d’Optique, FR

Christopher Dainty
National University of Ireland, IE

Hugues Giovannini
Institut Fresnel, FR

Programme committee
Roel Baets
Epixnet C/O Ghent University - IMEC, BE
Silvia Carrasco
ICFO - The Institute of Photonic Sciences, ES
Hans-Jürgen Hartmann
OptecNet Deutschland, DE
Ajoy Kar
Heriot-Watt University, UK
Thomas Pertsch
Friedrich-Schiller-Universität Jena, DE
Malgorzata Kujawinska
Warsaw University of Technology, PL
GRAND CHALLENGES OF PHOTONICS

Synopsis
For the second time, EOS will dedicate a special session to the “Grand Challenges of Photonics” focusing on the fantastic capabilities of photonics and the science of light. Photonics is a true enabling technology that each one of us uses on a daily basis. For example, it brings us information over the internet, it provides new ways for energy production and lighting, it is used for treatments of diseases and it can create the warmest and the coldest place in the universe.

Grand Challenges of Photonics will give you the opportunity to hear from world-class speakers about technologies which are revolutionary, uncommon and not realizable to date, but can pave the way for a bright future in optics and photonics.

Grand Challenges of Photonics is held in the spirit of Albert Einstein saying: “If we knew what it was we were doing, it would not be called research, would it?”

Invited speakers

- Light in femtoseconds: the making of molecular movies with ultrashort lasers
  Luis Bañares
  Universidad Complutense de Madrid, ES

- Inkjet printing in device and materials discovery
  Ghassan Jabbour
  University of Oulu, FI

- Geometry and light
  Ulf Leonhardt
  University of St Andrews, Scotland, UK

- Light trapping in thin-film solar cells
  Albert Polman
  FOM Institute AMOLF, NL

Chairs

Fredrik Laurell
KTH - Royal Institute of Technology, SE

Paul Urbach
University of Delft, NL
### Tuesday, 26 October

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>9:45 - 10:30</td>
<td>Historical perspective of nonlinear optics</td>
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<tr>
<td></td>
<td><strong>Yuen Ron Shen</strong>, Physics Department, University of California (US).</td>
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<td></td>
<td>The birth of nonlinear optics that immediately followed the invention of</td>
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<td>laser 50 years ago has revolutionized the field of optics. Continental</td>
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<td>new discoveries in the field over the years have created great</td>
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<td>excitement and tremendous impact in many areas of science and technology.</td>
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<td>Presented here is a brief survey on the progress of nonlinear optics in</td>
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<td>the past as well as a projection into the future. [3380]</td>
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### Wednesday, 27 October

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<th>Time</th>
<th>Session</th>
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<tr>
<td>11:15 - 12:00</td>
<td>Trends in nanoplasmonics: smaller, faster, stronger</td>
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<tr>
<td></td>
<td><strong>Mark L. Stockman</strong>, Department of Physics and Astronomy, Georgia State</td>
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<td>University (US).</td>
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<td></td>
<td>We consider latest developments in nanoplasmonics and its numerous</td>
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<td>applications. Nanoplasmonics deals with collective electron dynamics on</td>
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<td>the surface of metal nanostructures, which arises as a result of</td>
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<td>excitations called surface plasmons. The surface plasmons localize and</td>
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<td>concentrate optical energy in nanoscopic regions creating highly</td>
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<td>enhanced local optical fields. [3901]</td>
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<th>Time</th>
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<tr>
<td>12:00 - 12:45</td>
<td>Molecular control for organic photonics</td>
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<td><strong>Donal D.C. Bradley</strong>, Department of Physics and Centre for Plastic</td>
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<td>Electronics, Imperial College London (UK).</td>
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<td>This talk will focus on the influence of molecular structure (chemical</td>
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<td>and physical) on the optical properties of organic semiconductor</td>
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<td>materials. In particular, I will discuss approaches to enhancing the</td>
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<td>potential of organic materials for application in photonics. Recent</td>
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<td>results will be presented from work addressing materials development</td>
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<td>for electrically pumped organic lasers, a metamaterials inspired</td>
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<td>approach to optical structure fabrication and the use of organic gain</td>
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<td>media for plasmonic amplifier structures. [3912]</td>
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### Thursday, 28 October

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<th>Time</th>
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<tr>
<td>11:00 - 11:45</td>
<td>Resonance waveguide gratings</td>
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<tr>
<td></td>
<td><strong>Markku Kuittinen</strong>, Department of Physics and Mathematics, University</td>
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<td>of the Eastern Finland (FI).</td>
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<td>Dielectric sub wavelength resonant waveguide gratings (RWGs) were</td>
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<td>designed and fabricated to act as reflectors. Furthermore, the usage of</td>
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<td>RWGs in enhancing of the second harmonic generation, the fluorescence</td>
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<td>signal and the Raman scattering was considered. [3395]</td>
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<td>11:45 - 12:30</td>
<td>Optofluidics</td>
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<td><strong>Demetri Psaltis</strong>, Ecole Polytechnique Federale de Lausanne (EPFL) (CH)</td>
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<td>Optofluidics refers to a class of adaptive optical circuits that</td>
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<td>integrate optical and fluidic devices. Familiar examples include</td>
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<td>liquid crystals and dye lasers. The introduction of liquids in the</td>
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<td>optical structure enables fine-tuning and reconfiguration of circuits</td>
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<td>so they can perform tasks optimally in a changing environment. We will</td>
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<td>discuss how the emergence of fluidic transport technologies at the micron</td>
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<td>and nanometer levels opens possibilities for novel adaptive optical</td>
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<td>devices. [3879]</td>
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### Friday, 29 October

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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>11:15 - 12:00</td>
<td>Is this the beginning of a new age in green photonics?</td>
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<td><strong>Michael Lebby</strong>, Translucent Inc. (US).</td>
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<td>We may not have seen it, we may not have felt the impact, but green</td>
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<td>photonics has been quietly growing in our lives over the past decade.</td>
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<td>Engineers and scientists have always designed for efficiency in mind</td>
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<td>when they researched or built products. It is only in the recent few</td>
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<td>years, that our community has realized the bigger picture, and global</td>
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<td>impact of green photonics. Engineers and scientists will still strive</td>
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<td>for energy efficiency, cleaner solutions and improved health in their</td>
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<td>designs, except now, along with a larger percentage of the population,</td>
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<td>they focus more of their design in areas that impact beyond the</td>
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<td>actual product design itself. It is now a case of designing photonics</td>
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<td>for a greener world. Over the past half decade, the topic has become</td>
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<td>topical, political, and to some extent even cultural. [3360]</td>
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<tr>
<th>Time</th>
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<tr>
<td>12:00 - 12:45</td>
<td>Terahertz dynamics of condensed matter from the quantum limit to</td>
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<td>ultrahigh fields</td>
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<td><strong>Alfred Leitenstorfer</strong>, University of Konstanz, Department of Physics</td>
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<td>a. Center for Applied Photonics (DE).</td>
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<td></td>
<td>Recent studies on ultrafast dynamics of solids and nanostructures using</td>
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<td>few-cycle multi-terahertz pulses are presented. Phase-locking</td>
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<td>excitations transients with peak amplitudes beyond 1 V/Å are combined</td>
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<td>with uncertainty-limited electro-optic detection, resulting in an</td>
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<td>advanced access to the quantum properties of both condensed matter and</td>
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<td>light fields. [3615]</td>
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TUESDAY, 26 OCTOBER

9:00 - 9:15 Welcome by the General Chair Hans Peter Herzig, EOS President (CH).

9:15 - 9:45 OPENING TALK

Thomas Skordas, Head of the Photonics Unit of the European Commission (BE).

9:45 - 10:30 PLenary TALK (TOM 6)

Historical perspective of nonlinear optics

Yuen Ron Sheu, University of California (US).

10:30 - 11:00 Coffee break (exhibition hall)

11:00 - 12:20 TOM 4: Diffractive and holographic structures

11:00 - 12:35 TOM 1: Microfluidic devices and systems

TOM 2: Terahertz metamaterials

TOM 3: Metamaterials

TOM 5: Hybrid electronics

TOM 6: Temporal effects

12:20 - 13:45/12:35 - 14:00 Lunch break

13:45 - 16:00 TOM 4: Sub-wavelength and polarization sensitive micro-optics

14:00 - 16:00 TOM 1: Nano-optics and biosensing

TOM 2: THz generation and modulation

TOM 3: Theory and modelling

TOM 5: Organic photonics

TOM 6: Nanostructured materials

16:00 - 16:30 Coffee break (exhibition hall)

16:30 - 18:00 TOM 5: Spectroscopy, photonics and hybrid materials

16:30 - 18:15 TOM 2: THz imaging I - near and far-field imaging

16:30 - 18:30 TOM 1: Optical trapping for biosensing

TOM 3: Gratings for nanophotonics

TOM 4: Fabrication methods

TOM 6: Fundamentals

18:30 - 20:30 Welcome reception

Open to all attendees of EOSAM 2010.

WEDNESDAY, 27 OCTOBER

8:45 - 10:45 TOM 4: Micro-optics for fabrication, measurement and interferometry I

9:00 - 10:45 TOM 1: Optical nanosurgery and cell micromanipulation

TOM 2: THz quantum cascade lasers

TOM 3: Photonic cavities

TOM 5: Organic lasing and optical amplification

TOM 6: Compression and filamentation

10:45 - 11:15 Coffee break (exhibition hall)

11:15 - 12:00 PLenary TALK (TOM 3)

Trends in nanoplasmonics: smaller, faster, stronger

Mark I. Stockman, Georgia State University (US).

12:00 - 12:45 PLenary TALK (TOM 5)

Molecular control for organic photonics

Donal D.C. Bradley, Imperial College London (UK).

12:45 - 13:45 Lunch break

13:45 - 15:15 POSTER SESSION I and EXHIBITION ONLY

15:15 - 17:35 Grand Challenges of Photonics

17:35 - 18:00 Coffee break (exhibition hall)

18:00 - 20:00 EOS Annual General Meeting & EOS Prize and Fellows Ceremonies

Open to all EOS members & attendees of EOSAM 2010.
### THURSDAY, 28 OCTOBER

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Room</th>
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<tbody>
<tr>
<td>8:45 - 10:30</td>
<td><strong>TOM 7:</strong> Photonics for solar energy</td>
<td>Maiman</td>
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<tr>
<td>9:00 - 10:30</td>
<td><strong>TOM 1:</strong> Micro- and nanotechnologies for biomedical applications</td>
<td>Lippmann</td>
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<td></td>
<td><strong>TOM 2:</strong> THz imaging II - far-field imaging</td>
<td>Michelson</td>
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<td><strong>TOM 3:</strong> Nano-antennas</td>
<td>Newton</td>
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<td></td>
<td><strong>TOM 4:</strong> Micro-optics for fabrication, measurement and interferometry II</td>
<td>Newton</td>
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<td><strong>TOM 5:</strong> Organic photovoltaic materials and devices</td>
<td>Huygens</td>
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<td><strong>TOM 6:</strong> Spatial and spatiotemporal effects</td>
<td>Fresnel</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Coffee break (exhibition hall)</td>
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<tr>
<td>11:00 - 11:45</td>
<td><strong>PLENARY TALK</strong> (TOM 4) Amplitude waveguide gratings</td>
<td>Fresnel</td>
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<td></td>
<td>Markku Kuitunen, Department of Physics and Mathematics, University of the Eastern Finland (FI).</td>
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<tr>
<td>11:45 - 12:30</td>
<td><strong>PLENARY TALK</strong> (TOM 1) Optofluidics</td>
<td>Fresnel</td>
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<td>12:30 - 13:30</td>
<td>Lunch break</td>
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<td>13:30 - 15:00</td>
<td><strong>POSTER SESSION II and EXHIBITION ONLY</strong></td>
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<td>15:00 - 15:45</td>
<td><strong>TOM 1-7 JOINT Post-deadline session</strong></td>
<td>Fresnel</td>
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<td>16:00 - 16:45</td>
<td><strong>TOM 5:</strong> Organic photovoltaics and spectroscopy of related materials</td>
<td>Huygens</td>
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<td>16:00 - 17:00</td>
<td><strong>TOM 1:</strong> Perspectives on biophysical dynamics, kinetics and imaging</td>
<td>Lippmann</td>
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<td><strong>TOM 2:</strong> THz spectroscopy of organic and biological material</td>
<td>Michelson</td>
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<td><strong>TOM 3:</strong> Sub-wavelength waveguiding</td>
<td>Foucault</td>
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<td><strong>TOM 4:</strong> Biological applications</td>
<td>Newton</td>
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<td><strong>TOM 6:</strong> Biological applications and imaging</td>
<td>Fresnel</td>
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<td><strong>TOM 7:</strong> New advanced photovoltaic devices</td>
<td>Maiman</td>
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<td>17:00 - 17:30</td>
<td>Coffee break (Bar terrasse)</td>
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<td>17:30 - 18:45</td>
<td><strong>TOM 2:</strong> Terahertz spectroscopy techniques and tools</td>
<td>Michelson</td>
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<td><strong>TOM 5:</strong> High-speed signal processing and ultra-fast phenomena</td>
<td>Huygens</td>
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<td><strong>TOM 6:</strong> Nonlinear lattices and waveguides</td>
<td>Fresnel</td>
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<td>17:30 - 19:00</td>
<td><strong>TOM 1:</strong> Advanced and optimized photonics technology</td>
<td>Lippmann</td>
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<td>17:30 - 19:30</td>
<td><strong>TOM 3:</strong> Nanoparticles</td>
<td>Foucault</td>
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<td>17:30 - 19:45</td>
<td><strong>TOM 4:</strong> Active micro-optics &amp; lasers</td>
<td>Newton</td>
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<td></td>
<td><strong>ICO Prize and Galileo Galilei Award Ceremonies</strong></td>
<td>Maiman</td>
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### FRIDAY, 29 OCTOBER

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<tr>
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<tbody>
<tr>
<td>9:00 - 10:45</td>
<td><strong>TOM 2:</strong> THz solid-state spectroscopy</td>
<td>Michelson</td>
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<td><strong>TOM 3:</strong> Plasmonics</td>
<td>Foucault</td>
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<td><strong>TOM 4:</strong> Simulation and theory</td>
<td>Newton</td>
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<td><strong>TOM 6:</strong> Parametric sources and effects</td>
<td>Fresnel</td>
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<td><strong>TOM 7:</strong> Optical design and processing For photovoltaic concentrators</td>
<td>Maiman</td>
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<td>Coffee break (Bar terrasse)</td>
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<td>11:15 - 12:00</td>
<td><strong>PLENARY TALK</strong> (TOM 7) Is this the beginning of a new age in green photonics?</td>
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<td>12:00 - 12:45</td>
<td><strong>PLENARY TALK</strong> (TOM 2) Terahertz dynamics of condensed matter:</td>
<td>Fresnel</td>
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<td>from the quantum limit to ultrahigh fields</td>
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<td>Alfred Leitenstorfer, University of Konstanz (DE).</td>
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<td>12:45 - 13:45</td>
<td>Lunch break</td>
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<td>13:45 - 15:00</td>
<td><strong>TOM 2:</strong> THz systems and facilities</td>
<td>Michelson</td>
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<td>13:45 - 15:15</td>
<td><strong>TOM 6:</strong> Coherent effects, quantum effects, and chaos</td>
<td>Fresnel</td>
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<td>13:45 - 16:15</td>
<td><strong>TOM 3:</strong> High-resolution imaging</td>
<td>Foucault</td>
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<td><strong>TOM 4:</strong> Gradient index and guided optics</td>
<td>Newton</td>
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<td><strong>TOM 5:</strong> Workshop on entrepreneurship and business innovation in PhD education</td>
<td>Lippmann</td>
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<td>13:45 - 16:30</td>
<td><strong>TOM 7:</strong> Novel technologies for high performance solar concentrators</td>
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<td><strong>Farewell</strong></td>
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### Tuesday, 26 October

**9:00 - 9:15**

Welcome by the General Chair of EOSAM 2010

**Hans Peter Herzig**


**9:15 - 9:45**

Opening Talk

**Thomas Skordas**

Head of the Photonics Unit of the European Commission (BE).

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<th>Room: Malmaison</th>
<th>Room: Michelson</th>
<th>Room: Foucault</th>
<th>Room: Newton</th>
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| **10:30 - 11:00**

Coffee break (exhibition hall)

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**11:00 - 12:35**

**Microfluidic devices and systems**

Session chair: G. von Bally

Westfälische Wilhelms-Universität Münster (DE)

**11:00 - 11:05**

**Introduction**

Optical Integration for microfluidic systems

**J.S. Wilkinson**

Optoelectronics Research Centre, University of Southampton (UK)

Integrated optical waveguides offer great potential for constructing sensors and sorters for integrated optofluidic devices in low-cost on-chip systems. Progress towards optical integration for bioanalysis will be discussed, with examples in key applications, and challenges and opportunities will be described.

**[3549]**

**11:05 - 11:10**

**Invited Talk**

Terahertz metamaterials: recent developments and new opportunities

**R.D. Averitt**

Boston University, Dept. of Physics and Photonics Center (US)

This master class will introduce metamaterials including an overview of progress at terahertz frequencies during the past five years. Subsequently, specific results will be presented with an emphasis on active and reconfigurable metamaterials including a discussion of potential future research directions.

**[3288]**

**11:10 - 11:15**

**Invited Talk**

Terahertz metamaterials: recent developments and new opportunities

**B. Javidi**


We present an overview of our work on real time non-invasive sensing and identification of living micro/nano organisms such as cells, bacteria, etc. using computational 3D imaging. Both digital holography and integral imaging sensing approaches are presented.

**[3116]**

**11:15 - 11:20**

**Invited Talk**

Amorphous metamaterials

**C. Rockstuhl**

1. Institute of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Universität Jena (DE), 2. Institute for Physical Chemistry, Ruprecht-Karls-Universität Heidelberg (DE)

We review our recent activities on amorphous metamaterials consisting of strongly scattering unit cells that are aperiodically arranged. We distinguish between amorphous metamaterials that can be fabricated by top-down or bottom-up approaches and show how they can solve some problems associated to periodic metamaterials.

**[3330]**

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**11:20 - 11:25**

**Invited Talk**

Diffractive and holographic structures

**Z. Jaroszewicz**

Institute of Applied Optics (PL)

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**EOSAM 2010 I www.myeos.org/events/eosam2010**

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**Tuesday, 26 October**

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<td>Hans Peter Herzig, EOS President, Ecole Polytechnique Fédérale de Lausanne - EPFL IMT OPT (CH).</td>
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<td>9:15 - 9:45</td>
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<td>9:45 - 10:00</td>
<td><strong>PLENARY TALK</strong></td>
<td>Room: Amphithéâtre Fresnel</td>
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<td>Historical perspective of nonlinear optics</td>
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<td>Y. Ron Shen, Physics Department, University of California (US).</td>
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<td>The birth of nonlinear optics that immediately followed the invention of laser 50 years ago has revolutionized the field of optics. Continual new discoveries in the field over the years have created great excitement and tremendous impact in many areas of science and technology. Presented here is a brief survey on the progress of nonlinear optics in the past as well as a projection into the future.</td>
<td>Room: Amphithéâtre Fresnel</td>
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<td>10:00 -em-</td>
<td><strong>Hybrid electronics</strong></td>
<td>TOM 5</td>
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<td>11:00 - 12:35</td>
<td><strong>Temporal effects</strong></td>
<td>TOM 6</td>
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<td>Session chair: K.S. Wong, The Hong Kong University of Science and Technology (CN)</td>
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<td>11:00 -11:05</td>
<td><strong>FRET optoelectronics</strong></td>
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<td>P.G. Lagoudakis, School of Physics and Astronomy, University of Southampton (UK).</td>
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<td>We engineer Fluorescence Resonance Energy Transfer (FRET) into hybrid organic/inorganic and colloidal/epitaxial semiconductor nanostructures and utilise it as an efficient mechanism to couple these heterogeneous material systems leading to improved efficiencies both in photovoltaic solar and light emitting diode devices.</td>
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<td>11:05 -11:05</td>
<td><strong>Optical rogue waves: extreme events in supercontinuum generation</strong></td>
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<td>D.R. Solli(^1), C. Ropers(^2), B. Jalali(^1); (^1)University of California Los Angeles, Department of Electrical Engineering (US), (^2)Courant Research Center Nano-Spectroscopy and X-Ray Imaging, University of Göttingen (DE). Optical rogue waves have been observed during spectral broadening. The method of experimentally detecting these rare events by their redshifted energy is discussed in different input power and noise regimes of supercontinuum generation.</td>
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We present recent progress in the field of sensing fluorescently labeled biomolecules, as separated by microfluidic devices. A dedicated layer design for liquid-core waveguides results in fluidically reconfigurable filters with 30 dB rejection and more than 8-fold improvement in the signal-to-noise ratio of FRET measurements. [3308]

In this paper we present the use of terahertz time-domain spectroscopy in the far-infrared regime. [3281]

We investigated the plasmonic-like resonances in nanostructured metamaterials consisting of an array of aligned Au rods. Experimental results and modelling were compared and the properties of the plasmonic resonances were determined. [3502]

In this paper we use terahertz time-domain spectroscopy to simulate the behavior of a beam propagating in a left-handed slab and in a metamaterial structure and in both cases giant negative lateral shift are obtained. [3281]

We report the implementation of on-chip spectral filtering for biosensing in optofluidic devices. A dedicated layer design for liquid-core waveguides results in fluidically reconfigurable filters with 30 dB rejection and more than 8-fold improvement in the signal-to-noise ratio of FRET measurements. [3308]

A novel approach for design, interpretation and fabrication of high efficient three-level grating M. Oliva, D. Michaelis, T. Benkenstein, J. Dunkel, T. Harzendorf, A. Matthes, U.D. Zeitner; Fraunhofer Institute for Applied Optics & Precision Engineering (DE). This three level gratings in the resonance domain without shadowing losses based on an appropriate three-beam interference mechanism are designed and realized. A new technological approach allows for fabrication of homogeneous large area gratings without spurious artefacts and efficiencies of about 90%. [3529]
Ultrafast excitation energy transfer in small semiconducting carbon nanotube aggregates

L. Luer1,2, J. Crochet3,4, T. Hertel5, G. Cerullo1, G. Lanzani6; 1Politecnico di Milano, CNR/INFM-ULTRAS (IT); 2Madrid Institute of Advanced Studies, IMDEA Nanociencia (ES); 3Universität Würzburg, Institut für Physikalische und Theoretische Chemie (DE); 4Los Alamos National Laboratory, Center for Integrated Nanotechnologies (US); 5Politecnico di Milano, Dipartimento di Fisica (IT); 6Center for Nanoscience and Technology of IIT@POLIMI (IT).

We present a time-domain study of the transfer of excitonic population between carbon nanotubes in small hexagonal aggregates. Using pump-probe spectroscopy with 20 fs pump and probe pulses, tuned to the first excitonic transition of the (6,5) CNT, we observe transfer towards the (7,5) tube in less than 10 fs. [3526]
In this talk, we describe our recent efforts to improve on classical electromagnetic theory in the description of metal nanostructure (plasmonic) optical properties, with emphasis on surface enhanced Roman spectroscopy. A top-down approach involves the use of nonlocal dielectric response in classical electrodynamics. [3035]

We show that a resonant response with very high quality factors can be achieved in periodic metamaterials by radiatively coupling their structural elements. The coupling is mediated by lattice modes and can be efficiently controlled by tuning the lattice periodicity. Using a recently developed terahertz (THz) near-field imaging technique and conventional far-field spectroscopy together with numerical simulations we pinpoint the underlying mechanisms. In the strong coupling regimes we identify avoided crossings between the plasmonic eigenmodes and the diffractive lattice modes. [3581]

The far-field transmission spectrum of crescent-like metallic nanostructures on a glass substrate is studied numerically. The interpretation of transmission resonances arising from a periodic U-shaped metal nanostructure is revisited. Appearing of additional resonances and impact of the structure geometry on their positions is discussed. [3401]

We have studied trapping and propulsion of red blood cells in the evanescent field of an optical waveguide. In particular, we have measured the propulsion velocity as a function of the waveguide width. [3547]

We have developed terahertz (THz) near-field spectroscopy together with conventional classical electrodynamics and describe its extension to 1D and 2D structures for manipulation of polarised light. [3383]

In this paper we shall review the fundamentals of this technology and describe its extension to 1D and 2D structures for manipulation of polarised light. [3383]
Threaded molecular wires: recent achievements and future prospects for organic photonics and electronics

F. Cacialli; Department of Physics and Astronomy, and London Centre for Nanotechnology, University College London (UK).

Threaded molecular wires (TMWs) are supramolecular architectures that can be conveniently used for fundamental studies in the context of organic electronics. Of particular interest is the possibility of insulating conjugated polymers for controlling intermolecular interactions, while still preserving their intrinsic semiconducting properties. Here, we will review recent achievements obtained within the context of the Marie-Curie Research Training Network, THREAD-MILL (www.threadmill.eu) and outline future perspectives for the development of the science and technology of these intriguing materials. [3487]

Second harmonic generation from gold nanoparticles: From ensemble to single nanoparticle measurements

J. Butet, G. Bachelier, I. Russier-Antoine, Ch. Jonin, E. Benichou, P.F. Brevet; Laboratoire de Spectrométrie Ionique et Moléculaire, UMR CNRS 5579, Université Claude Bernard Lyon 1 (FR).

We report the Second Harmonic Generation (SHG) from gold nanoparticles dispersed in homogeneous matrices allowing for the determination of their intrinsic nonlinear optical properties. In ensemble measurements, we can observe the interference patterns between selected multipolar modes of the SHG response. At the single particle level, we present a two dimensional mapping of single metallic particles dispersed in a homogeneous matrix and the corresponding light polarization analysis. [3497]
The purpose of the present study is to improve the understanding of the origin of the negative refraction in the so-called fishnet structure, i.e., a hole array drilled in a metal/dielectric/metal periodic stack. The theory relies on the elementary scattering processes of plasmonic guided modes inside the structure. We discuss the physical mechanisms responsible for the appearance of a negative effective index with low loss in the near-infrared. [3465]

14:05 Confinement of light in marine centric diatoms: a study of the wavelength dependence
E. De Tommasi, I. Reo, V. Mocella, L. Moccetti, M. De Stefano, I. Rendl, L. D. Stefano. [3448]}

15:00 Concentric ring metal grating for generating radially polarized light
Z. Ghadyani,* I. L. Varteni, L. Harder, W. Iff, A. Berger, N. Lindleins, M. Kuhntiner. [3405]
Chirality appearance in molecular films of achiral molecules at the air/water interface

E. Benichou1, I. Russier-Antoine1, G. Bachellerie2, Ch. Janin1, M. Liu2, P.F. Brever1; Laboratoire de Spectrométrie Ionique et Moléculaire, UMR CNRS 5579, Université Claude Bernard Lyon1 (FR); 1Beijing National Laboratory for Molecular Sciences, Institute of Chemistry (CN).

Second Harmonic Generation was used to study optical properties of twodimensional films formed at the air-water interface. The film reveals chirality arising from the formation of molecular aggregates. It is demonstrated that this chiral property arises from electric and magnetic dipole contributions. [3333]

Fabrication of active and functional organic photonic crystal templates using holographic lithography

K.S. Wong1, A.B. Djurić1, J. Zhou2, A.B. Djuričić2; Hong Kong University of Science and Technology, Department of Physics (HK); 3Tampere University of Technology, Institute of Physics, Optics Laboratory (FI); 2National Institute of Telecommunications, Department of Transmission and Optical Technology (FI); 1University of Eastern Finland, Department of Physics and Mathematics (FI).

Two-dimensional organic photonic crystals (PCs). These PCs were used as templates to make active/functional materials (PCs). These PCs were used as templates to make active/functional devices such as organic distributed feedback laser or ZnO PC with enhanced spontaneous emission rate and lower lasing threshold. [3370]

Efficient second-harmonic generation from a single gold dimer

A. Slablab1, X.L. Le, M. Zielinski2, A. Slablab, X.L. Le, M. Zielinski; Institut de Physique, Optique Quantique, UMR CNRS 8537 ENS Cachan (FR).

Optimizing the interaction of light with a nanometer-sized volume of matter is a major objective of nanophotonics. It may contribute to the elaboration of future nanodevices like nanosources or nanoprobes. Recently, nanoparticles with second-order nonlinear response have been investigated and the second-harmonic generated field has been studied in detail. Yet it would desirable to engineer the efficiency of such nonlinear nanosources. The efficiency may be enhanced by using a material with a large electronic response to an electromagnetic excitation, which is the case for metallic nanoparticle, and a structuration that can develop localized high field intensity. [3392]
Heterodyne holographic microscopy of gold nanoparticles in biological media
F. Joud1, F. Verpillot2, M. Atlani, M. Abbadou3, M. Gross3,1, Laboratoire Kastler Brossel, École Normale Supérieure (FR), Institut Langevin, ESPCI (FR), Département Physique - Faculté des Sciences, Université Saint-Joseph (LB).

We present a new holographic microscope combining off-axis heterodyne geometry and phase-shifting acquisition. Observation of 40 nm gold nanoparticles conjugated to 3T3 mouse fibroblasts is reported. [3402]

Continuous-wave optical parametric oscillator for terahertz light
J. Kießling, I. Braunig, R. Sowada, K. Buse; University of Bonn, Institute of Physics (DE).

We demonstrate the generation of continuous-wave terahertz light at 1.4 THz frequency by parametric oscillations. The emitted beam has a power of several μW, a MHz linewidth and can be focused to a diffraction-limited spot. Furthermore, we show that the signal waves can be used to detect the terahertz wave coherently. [3228]

Efficient modeling of multiflaved metallic strip gratings
H. Etait1, B. Guzzoli1, M. Ouelet2, T. Gharbi1; 1FEMTO-ST, UMR CNRS No. 6174 (FR), 2Equipe de Nanophotonique, G.E.S. UMR 5450 (FR), 3Faculté des Sciences de Tunis, U.R. Spectroscopie Roman (TNI).

The parametric formulation of the Combined Boundary conditions Method (CBCM) with spatial adaptive resolution is extended to multilayered structures of strip gratings using a new method to solve the eigenvalue problem in all the layers. [3555]

Terahertz generation from layers of strip gratings
A.M. Armeneu1,2, L.B. Andrioumanopoulos1,3,4, K. Ede2, G. Granet2,3, P. Schiovane1; 1Laboratoire des Technologies de la Microélectronique CNRS (FR), 2CEN-CNRS, INAC/SP2M (FR), 3Departement of Physics, Loughborough University (UK), 4Département of Physics, King Abdulaziz University (SA); 1Russian Acad. Sci., Inst. Radio Engn. and Elect (RU).

We have developed a new device for a generation of terahertz radiation operated with flux cloning phenomena arising in superconducting circuits. The device made from a long Josephson T-shaped junction with Nb-AlOx-Nb material. We have tested the device and found that the spectral line of T-rays radiation is very narrow. We have also described the properties of such a device and the dynamics of vortices there. [3675]

8055 THz frequency by parametric oscillation
M. Ouelet1, M. Marchetti2, J. Kiessling1, I. Breunig1, R. Sowade2, K. Buse; 1University of Bonn, Institute of Physics, 2University of Loughborough, Department of New Materials and Biosystems (DE), Friedrich Schiller University Jena, Institute of Applied Physics (DE).

The metrology of the correlation properties of circularly-polarized and linearly-polarized plane waves
O.V. Angelsky1, M.P. Gorsky1, N.V. Gorodynska2, 1Department of Correlation Optics, Chernivtsi National University (UA), 2Department of New Materials and Biosystems, Chernivtsi National University (UA).

The paper shows the possibilities of defining the degree of correlation of mutually orthogonal superposing circularly-polarized and linearly-polarized plane waves. The alternative method for estimating the correlation properties of interacting fields is proposed here. [3046]
### Amphithéâtre Fresnel

<table>
<thead>
<tr>
<th>Time</th>
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<tr>
<td>15:15</td>
<td>Flexible microcavities: directional photoluminescence enhancement</td>
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<tr>
<td>15:30</td>
<td>Directional enhancement of the photoluminescence in bisTEG-PEPEP solution infiltrated opals</td>
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<tr>
<td>15:45</td>
<td>Photonic polyurethane based on diarylthiophenes for holography</td>
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<tr>
<td>15:45</td>
<td>Biomimetic silica-based nanocomposite materials for nonlinear optics</td>
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</table>

### Notes

- **Student presentation**
  - Flexible microcavities: directional photoluminescence enhancement
  - L. Frezza, M. Lusciardi, M. Patra, D. Camaretto, Università degli Studi di Genova, Dipartimento di Chimica e Chimica Industriale (IT);
  - Università degli Studi di Pavia, Dipartimento di Fisica “A. Volta” (IT).

- **Amphithéâtre Fresnel**
  - We have prepared full plastic one-dimensional photonic crystal with a defect layer made of poly(9,9'-dioctyfluorene-co-benzothiadiazole) (FBBT). The optical properties of these flexible microcavities have been investigated and modelled. It is shown that strong directional enhancement of the emission occurs due to light localization in the defect layer. [3343]

- **Flexible microcavities: directional photoluminescence enhancement**
  - L. Frezza, M. Lusciardi, M. Patra, D. Camaretto, Università degli Studi di Genova, Dipartimento di Chimica e Chimica Industriale (IT);
  - Università degli Studi di Pavia, Dipartimento di Fisica “A. Volta” (IT).

- **Directional enhancement of the photoluminescence in bisTEG-PEPEP solution infiltrated opals**
  - L. Berti, F. Di Stasio, M. Galli, F. Morabello, N. Mantredi, A. Abbattista, D. Camaretto, Università degli Studi di Genova, Dipartimento di Chimica e Chimica Industriale (IT);
  - Università degli Studi di Pavia, Dipartimento di Fisica “A. Volta” (IT);
  - Università degli Studi di Milano-Bicocca, Dipartimento di Scienza dei Materiali (IT).

- **Photonic polyurethane based on diarylthiophenes for holography**
  - A. Bianco, C. Bertarelli, Università degli Studi di Genova, Dipartimento di Chimica, Materiali ed Ingegneria Chimica, Politecnico di Milano (IT).

- **Biomimetic silica-based nanocomposite materials for nonlinear optics**

- **Plasmon-assisted resonant third-order nonlinear optical effects in core-shell nanoparticles**
  - I.A. Kolmychev, T.V. Murzina, O.A. Aktsipetrov; Department of Physics, Moscow State University (RU).

- **Enhanced second-harmonic generation from BaTiO$_3$ – SrTiO$_3$ superlattices**
  - A. Scari, H. Pientarinen, G. Genty, J. Hiltunen, L. J. Lappalainen, M. Kauranen, Tampere University of Technology, Optics Laboratory (FI);
  - Technical Research Centre of Finland (FI);
  - University of Oulu, Microelectronics and Materials Physics Laboratory (FI).

- **Enhanced second-harmonic generation from BaTiO$_3$ – SrTiO$_3$ superlattices**
  - A. Scari, H. Pientarinen, G. Genty, J. Hiltunen, L. J. Lappalainen, M. Kauranen, Tampere University of Technology, Optics Laboratory (FI);
  - Technical Research Centre of Finland (FI);
  - University of Oulu, Microelectronics and Materials Physics Laboratory (FI).

- **Biomimetic silica**
  - Biomimetic silica is the tools used to make it possible. Moreover, these materials have to guarantee good optical properties to be efficiently used. [3694]
**Room: Mainman**

**TOM 1**

16:30 - 18:30  
Optical trapping for biosensing  
Session chair: D. Cajoec  
CNR-INFM, Laboratorio Nazionale TASC (IT)

16:30  
**INVITED TALK**  
Optical tools and techniques for studying behavior and neuronal regeneration in the roundworm *C. elegans*  
S.H. Chung1,2, E. Mazur1, C.V. Gabrie1, Boston University School of Medicine, Department of Physiology and Biophysics (US), 2Harvard University, School of Engineering and Applied Sciences (US), 2Harvard University, Department of Physics (US).

Femtosecond laser ablation can disintegrate the nervous system of *C. elegans* with submicrometer resolution. Microfluidic devices allow us to immobilize, position, and assay the worm. Using these techniques we can illuminate the origins of behavior and mechanisms of neuronal regeneration. [3481]

17:00  
**Student presentation**  
Trapping and stretching of single cells in an optofluidic chip fabricated by a femtosecond laser  
F. Bragheri1, L. Ferrara2, N. Bellini1, K.C. Vishnubhatla3, P. Minzioni1, R. Rampone1, R. Ossiel1, I. Cristiani1, 1CNSM and Dipartimento di Elettro- nica – Università di Pavia (IT), 2IFIM-CNR and Dipartimento di Fisica – Politecnico di Milano (IT), 3CNST (Center for Nano Science and Technology), IIT @ Polimi (IT).  
We present an optofluidic monolithic chip able to perform single-cell trapping and stretching without physical contact. The chip is based on a fused silica glass substrate and it is fabricated by femtosecond laser micro-machining. [3454]

**Room: Michelson**

**TOM 2**

16:30 - 18:15  
Thz Imaging I – near and far-field imaging  
Session chair: M. Walther  
University Freiburg, Physik (DE)

16:30  
**TOM 3**  
Thz near-field microscopy of complementary metamaterial structures: Babinet’s principle  
A. Ormer1, A. Bitzer2, M. Walther1, Freiburg Materials Research Center, University of Freiburg (DE), Institute of Applied Physics, University of Bern (CH).  
We apply terahertz (THz) near-field microscopy to investigate the resonant response of plain and complementary split-ring resonators. The field maps show that at the resonances the measured electric nearfields of the structures correspond to the magnetic near-fields of their complements, as also predicted by recent numerical simulations in consistence with Babinet’s principle. [3580]

17:00  
**Student presentation**  
Influence of the dielectric substrate on the Terahertz electric near-field of a hole in a metal  
L. Guestin, P.C.M. Planken, A.J.L. Adam, Delft University of Technology (NL).  
We present calculations and experimental observations on the electric field associated to a dielectric substrate on the frequency response of a metallic film. The study of the local density of states (LDOS), measurements are directly related to the magnetic near field of the metallic film. [3384]

**Room: Foucault**

**TOM 3**

16:30 - 18:30  
Gratings for nanophotonics  
Session chair: G. Schatz  
Northwestern University (US)

16:30  
**INVITED TALK**  
Colour filtering by laterally textured subwavelength structures  
H. Loohfrother, Papierfabrik Loutzen- thal GmbH (DE).  
Subwavelength structures may exhibit electromagnetic resonances in the visible wavelength range yielding to a strong modification of reflectance and transmittance. Laterally textured nanostructures with tuneable colour properties have great potential in industrial applications of colour filtering. [3324]

17:00  
**Student presentation**  
Local density of states fluctuations on random metallic films  
V. Kromholzisoff, E. Castanié, Y. De Wilde, R. Carminati, Institut Langevin, ESPCI ParisTech, CNRS UMR 7587 (FR).  
We report on the experimental study of lifetime fluctuations at the surface of disordered metallic films. Lifetime measurements are directly related to the local density of states (LDOS), that describes the optical transport properties of the metal. We find that the lifetimes distribution strongly depends on the topological properties of the metallic film. [3384]

**Room: Newton**

**TOM 4**

16:30 - 18:30  
Fabrication Methods  
Session chair: F. Nikolajeff  
Uppsala University (SE)

16:30  
**INVITED TALK**  
Optical fabrication techniques for digital micro-optics  
B. Kraus, V. Hejmani, USI Photonics Inc. (US).  
This paper will review the various optimizations and adaptations of standard IC fab techniques that have been performed by industries in the last decades, in order to pave down the road for digital optics to reach the various conditions imposed by mainstream industry and consumer products, as it has been done its counterpart micro-electronics 50 years ago. [3372]

17:00  
**Student presentation**  
Phase-mask grating printing to ext-  
Y. Bourgin1, Y. Jourlin1, S. Tanchev1, I. Vartiainen3, M. Kultinen3, A. Tal- neau1, O. Parriaux1, 1University of Lyon, Lims, CNRS UMR CNRS 5516 (FR); 2Institute of Solid State Physics (BG); 3University of Eastern Finland, Department of Physics (FI); 4Lab. Photonique et Nanostructures, CNRS (FR).  
The very restricted range of grating periods printable by standard silica phase-masks is here extended from close to the 45 nm CD-node to arbi-

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<tr>
<td>16:30</td>
<td>Spectroscopy, photonics and hybrid materials</td>
<td>Huygens</td>
<td>A targeted review of hybrid integrated photonics</td>
<td>B. Bêche, N. Huby, D. Duval, D. Pluchon, G. Loas, N. Coulon, H. Lhermite, L. Cambrelein, J. Zyss, L. Frein, E. Gaviot, Université Rennes 1, IPR UMR CNRS 6251 (FR); Université Rennes 1, IETR UMR CNRS 6164 (FR); Université Maine, LAUM UMR CNRS 6613 (FR); Ecole Normale Supérieure, LPQM UMR CNRS 8537 (FR).</td>
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<tr>
<td>17:00</td>
<td>Student presentation</td>
<td>Fresnel</td>
<td>The role of non-radiative energy transfer for efficient color-conversion in hybrid organic/GaN LEDs</td>
<td>J.J. Rindermann, P.G. Lagoudakis, University of Southampton, School of Physics and Astronomy (UK). Non-radiative energy transfer (FRET) is used to enhance the color-conversion efficiency in hybrid organic/GaN LEDs. We study FRET from the LED to an organic overlayer under optical pumping and electrical operation of the LEDs. [3366]</td>
</tr>
<tr>
<td>16:30</td>
<td>Fundamentals</td>
<td>Fresnel</td>
<td>Intense coherent transverse magnetism induced by light - experiments and theory</td>
<td>S.C. Rand, W.M. Fisher, Division of Appl. Phys., University of Michigan (US). A new class of magneto-electric nonlinearities is reported, that originates from a mixed $\langle D_0 B_0 \rangle$ product of applied fields. As the result of parametric enhancement, extraordinary levels of magnetic dipole radiation are observed at non-relativistic intensities. This and other unanticipated effects are in accord with recent theory. [3104]</td>
</tr>
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Notes:

- Student presentation
- Generation efficiency of the second harmonic inhomogeneous component in a GaAs cavity with conversion efficiency of the order of 0.1% at 612nm, using 3ps pump pulses with 10 MW/cm² peak intensities. We show that the conversion efficiency of the inhomogeneous second harmonic component grows quadratically with the cavity quality factor. [3304]
17:15 Immunofluorescence screening of cytomegalovirus in an opto-fluidic mobile device
T. Mangeat1, J.S. Guerin1, H. Benallia1, C. Pellar1, A. Boureau1, W. Boireau1, A. Coquet2, G. Herbette1, C. Davrieux1, L. Pazzol1, B. Waegge1
1 Optics Dpt, FEMTO-ST Institute, UMR CNRS 6174 (FR), 2 IN-SEMR-CIT 808, Besancon University Hospital (FR), 1 Clinico-Innovation Platform, FEMTO-ST Institute, UMR CNRS 6174 (FR), 2 Lab. of virology, University Hospital and UPR 4266 Agents, Pathogenies et Inflammation (FR), 3 INSERM U 563, Paul Sabatier University (FR).
We present an opto-fluidic mobile device used to screen the cytomegalovirus at the newborn’s bed. The detection is based on immunofluorescence and the device is composed of a disposable cartridge including all the required reagents and a mobile reader/actuator that drives the fluids and to perform the optical measurement. [3122]

17:30 Investigating the dynamics of helical bacteria trapped with line scanning optical tweezers
M. Koch, A. Rohrbach, University of Freiburg, Lab for Bio- and Nano-Photonics (DE).
We show how a scanning optical trap can be used to hold and orientate a single helically shaped bacterium of only 200nm thickness. In addition, we show that back focal plane interferometry can be used to get precise 3D information of the complex dynamics of these bacteria with high temporal resolution and nanometer spatial precision. [3277]

17:45 Antibody-mediated influenza viral detection by waveguide-mode sensor
Methods for the antibody-based detection of influenza viruses using monolithic-sensing plate technology of waveguide-mode sensors are demonstrated. Based on this method Hoemaggglutinin from influenza of bird (H5N1) and human (A/Panama/2007/1999) and human virus (A/Brisbane/59/2007) were detected. [3351]

17:15 Terahertz imaging of ferroelectric domains in the near-field domain
M. Berto, P. Kuetz, F. Kodiet; Institute of Physics AS CR (CZ).
We report on results of near-field pulsed THz imaging experiments with a metalized sapphire probe scanning a BiTiO₃ multi-domain single crystal. The method is sensitive to the direction of spontaneous polarization, and spatial resolution is better than the dimensions of the probe at its extremity. [3406]

17:30 Dynamic THz near-field imaging of free induction decay from tyrosine crystal
F. Blanchard1, A. Doi1, H. Hirono1, T. Tanako2, K. Tanaka2,1,2,3,4, Institute for Integrated Cell-Material Sciences, Kyoto University (JP), 2 CREST, Japan Science and Technology Agency (JP), 3 Olympus Corporation (JP), 4 Department of Physics, Graduate School of Science, Kyoto University (JP).
We report an near-field terahertz (THz) imaging of a tyrosine crystal sample using high intensity terahertz pulses. We observe the electric field blinking with the free induction decay (FID) signal with spatial resolution better than 70 μm. [3283]

17:45 Total internal reflection Terahertz Imaging
We present a new Terahertz imaging scheme based on total internal reflection that allows the study of aqueous samples. [3475]

17:15 Design of plasmonic nano-resonators to achieve power transmission enhancement through single sub-wavelength apertures
L. Scarrano, F. Bilotti, L. Vegni, University “Roma Tre”, Department of Applied Electronics (IT).
In this contribution we propose a novel setup based on arrangements of sliver nanoparticles to increase the power transmission through single sub-wavelength apertures. The design details and possible issues are discussed and illustrated through full wave simulations. The proposed approaches may be applied to the design of ultra-diffractive imaging systems, high-resolution spatial filters, high-resolution lithography systems. [3561]

17:30 Nanoliths in metallic membranes: nearly perfect transmission for multi-spectral imaging
S. Collin1, G. Vincenot1, R. Haidar1, N. Bardou1, J.-L. Pelouard1, Laboratoire de Photonique et de Nanostructures (LP2-CNRS) (FR), 3 ONERA, DOTA (FR).
We report the fabrication of large-area metallic membranes with nanoliths. We analyze their remarkable optical properties and demonstrate nearly perfect resonant transmission (87 %). Radiative and non radiative losses are experimentally determined. We also report the fabrication of a mosaic of bandpass filters by changing the slit pattern in a single 25mm² membrane. The filter array is integrated in a compact multichannel camera, and parallel multispectral imaging is achieved in the 2.5-5 μm wavelength range. [3492]

17:45 Coupling localized and propagating plasmons to improve the light transmission through metallic thin films
J. Delahaye, S. Grezillon, E. Fort, Institut Langevin, ESPCI ParisTech, CNRS UMR 7587, Université Pierre et Marie Curie, University Paris Diderot (FR).
We investigated the optical interactions between metal nanoparticle and thin metallic films using leakage radiation microscopy. The images of the nanoparticles deposited on the metallic thin films show an unexpectedly enhanced light transmission through the films. [3494]

17:15 Periodical microstructure fabrication based on the Talbot effect
The Talbot effect on pinhole arrays is utilized for periodical microstructure fabrication via proximity lithography in a mask aligner. A novel lighting system is used which offers a controllable angular spectrum of illumination. The proposed method comprises great flexibility and sub-micron resolution even in large proximity gaps. [3411]

17:30 Wafer level manufacturing of glass optics
D. Holstege, M. Hünst, O. Damborg, F. Kläcke, Fraunhofer Institute for Production Technology ITP (DE).
The wafer-based manufacturing approach, which perfectly uses the economics of scale, is already established for polymer optics. In this work, the manufacturing approach for glass optics molded on wafer scale is presented. It comprises a detailed view on each process step that needs to be accomplished. [3565]

17:45 Reflective hybrid optical components – Functionalization of non-planar optical surfaces using direct ps-laser ablation
R. Kleindienst, R. Kampmann, S. Stoebernau, S. Sintzing, Technische Universität Ilmenau, IMN MacroNano, Fachgebiet Technische Optik (DE).
Hybrid diffractive/refractive or diffractive/refractive components provide additional potential for the integration of complex optical functionality. We present an integrated approach for the manufacturing of hybrid optical components. To this end ps-laser ablation is combined with ultra precision micromachining of freeform optical surfaces. [3530]
### Synthesis and optical properties of a ter (9,9'-spirobifluorene)-co-methylmethacrylate copolymer

A. L. Mendonga, A. Cheras, J. Clark1, L. Bozzanaro, A. Nocivelli, G. Lanzoni, J. Morgado1; 1Instituto de Telecomunicaciones (PT); 2Dipartimento di Fisica, Politecnico di Milano (IT); 3Cavendish Laboratory, University of Cambridge (UK); 4Institute of Physics and Astronomy (UK); 5Instituto de Fisica, CNRS-UMR 6174, Université de Franche-Comté (FR).

The sensitized triplet-triplet annihilation in multi-component organic systems has been already demonstrated to be suitable for obtaining efficient up-conversion at ultra-low power in solution, but fails in the solid state. We demonstrated how it is possible to overcome this severe limitation by the incorporation of a standard bi-component system in polymer nanoparticles, preserving the same phase modulation efficiency in the solid state. We also presented the optical Kerr effect and free-carrier refraction, has a detrimental effect on the maximum on-off Raman gain achievable in silicon on insulator nanowaveguides, causing it to saturate, as we confirm with a simple calculation of the Raman gain.

### Flexible generation of nondiffracting beams and applications to femtosecond laser ablation


We report on the development and numerical modelling of a spatial light modulator based setup that allows for a flexible generation of femtosecond non-diffracting beams with long working distance and with a micron-size central spot. We also review recent results concerning the machining of high-aspect ratio channels in glass.

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### Notes

- **Room: Huygens**
  - 17:15 Student presentation
  - 17:45 Scanning thermochemical lithography of a conjugated polymer and the role of the thermal conductivity of the substrate
  - 17:30 Sensitive ultra low power photon up-conversion from solution to solid state

- **Amphithéâtre Fresnel**
  - 17:15 Student presentation
  - 17:45 Flexible generation of nondiffracting beams and applications to femtosecond laser ablation
This work is directed to the investigation of the scope of the technique of polarization spectrometry of oncological changes in model mice’s tissues and in human prostate tissues under the conditions of multiple scattering. [3355]

A prototype of an optofluidic sensor has been performed to reconstruct the cross-sections. Especially, phantoms have been used to investigate the diffraction and refraction losses. [3654]

We present LiNbO3 nanostructures by ultra precision micromachining. The unique variety of surface profiles fabricated by optical micromanipulation are discussed. [3422]
### 18:00
**Equivalent temperature of crystal interacting with laser radiation**

O.A. Ryabushkin\(^1\), A.V. Konyashkin\(^1,2,3\), D.V. Myasnikov\(^2,3\),

\(^1\)Kotelnikov Institute of Radio-engineering and Electronics of RAS (RU),
\(^2\)NTO «IRE-Polus» (RU),
\(^3\)Moscow Institute of Physics and Technology (State University) (RU).

Most of the nonlinear-optical crystals possess piezoelectric properties. Piezoelectric resonance, induced by the external radiofrequency electric field, allows measuring the internal temperature of the crystal, which interacts with the laser radiation.

[3480]

### 18:15
**Observation of the Optical Peregrine Soliton**

B. Kibler\(^1\), J. Fatome\(^1\), C. Finot\(^1\), G. Millot\(^1\), F. Dias\(^2\), G. Genty\(^3\), N. Akhmediev\(^4\), J.M. Dudley\(^5\),

\(^1\)Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 5209 CNRS - Université de Bourgogne (FR),
\(^2\)CMLA, ENS Cachan (FR), UCD School of Mathematical Sciences, University College Dublin (IE),
\(^3\)Tampere University of Technology, Optics Laboratory (FI),
\(^4\)Optical Sciences Group, Research School of Physics and Engineering, The Australian National University (AU),
\(^5\)Institut FEMTO-STUniversité de Franche-Comté (FR).

We report the first experimental observation of the optical Peregrine soliton, a novel class of nonlinear localized structure first predicted to exist over 25 years ago. Our results confirm the increasingly important role that experiments in optics play in providing insight into wider areas of nonlinear physics. [4017]

### 18:30 - 20:30 welcome reception
(Entrance area of PRI-OPTO)

**Notes**
We propose a local delivery optical force field and viscosity. The probe helps to find the local height profile of the sample can be measured interferometrically so that the elongation of the sample. The elongation of the probe helps to find the local force field and viscosity.

Stimulating of neurons by optically manipulated liposomes

G. Pinato, T. Raffaele, E. D'Este, F. Tavano, D. Cojoc, CNR-IOM, TASC Laboratory (IT).

We propose a local delivery optical technique to stimulate neuronal cells. Liposomes filled with glutamate solutions were manipulated by an IR optical tweezers in the vicinity of hippocampal neurons and broken by an UV pulsed laser. The stimulation of the cells by the delivered molecules was demonstrated by calcium imaging.

Injection locking of Terahertz Quantum cascade lasers to femtosecond mode-locked Er: Fiber lasers


A terahertz quantum cascade laser and an integrated Au-on-silicon are coupled to perform ultrafast gas gain switching. The resulting non-equilibrium gain is not clamped above laser threshold and large amplification of input terahertz pulses is demonstrated.

Phase-locking of terahertz quantum cascade lasers to a femtosecond mode-locked Er: Fiber laser


A terahertz quantum cascade laser and an integrated Au-on-silicon are coupled to perform ultrafast gas gain switching. The resulting non-equilibrium gain is not clamped above laser threshold and large amplification of input terahertz pulses is demonstrated.
Efficiency of 52%).

Laser emission (M2=1) with a convergent field pattern, allowing diffraction by a dielectric wedge remains an open problem which is being addressed through polymer-based micro-lasers. Actually their spectra and far-field patterns strongly depend on the shape of the resonator, in particular to the presence (or absence) of contour edge singularities. [3631]

We report on a solid state Vertical External Cavity Surface Emitting Laser (VECSEL) concept. This approach allows diffraction-limited laser emission (M2=1) with a conversion efficiency as high as 43% (slope efficiency of 52%). [3337]

Highly efficient vertical external cavity surface-emitting organic laser (vescels)

K.C. Vishubhatta1, 2, N. Bellini2, R. Osellame2, G. Lanzani3, 4, R. Ramponi2, T. Virgili2, 1Center for Nano Science and Technology of ICT, 2Istituto di Fotonica e Nanotecnologie - CNR and Dipartimento di Fisica - Politecnico di Milano (IT). We demonstrate a novel approach to organic photonic devices, where the unique properties of a conjugated polymer in solution are exploited in a microfluidic configuration in order to produce easy-to-integrate random lasing photonic devices. [3642]

Energy transfer between two femtosecond laser filaments in gases

M. Durand1, 2, Y. Liu1, Y. Chen1, A. Houard1, A. Myrskylä2, 1Laboratoire d’Optique Appliquée, ENSTA ParisTech – Ecole Polytechnique, CNRS UMR 7639 (FR), 2Département d’Optique Théorique et Appliquée, ONERA (FR). Energy transfer between two femtosecond filaments is demonstrated. The physical mechanism is attributed to a travelling plasma grating formed at the intersection of the beams. An energy transfer ratio as high as 50 percent is achieved for pulses with energy of several millijoules, which can be useful to remotely replenish filaments. [3195]

Pulse self-compression in pressurized cells filled with noble gases is one of the hot and challenging topics in ultrafast nonlinear optics. The impressively simple setup and the high compression rates achieved so far make this technique attractive for various applications, from material processing to pump-probe experiments. [3253]

We demonstrate a method to remotely control the Terahertz (THz) radiation emitted in air by femtosecond bifilaments, by fine tuning of the time delay between the two laser pulses. The phenomenon is relying on the molecular quantum lensing effect. [3194]
Wednesday, 27 October

Room: Maiman

10:00  Three-dimensional particle manipulation in stereoscopic optical tweezers using complex non-diffracting elliptical beams
C. Alpamani¹, R. Bowman², M. Woerdeman³, M. Podgornik³, C. Denz³
¹Westfälische Wilhelms Universität Münster, Institut für Angewandte Physik (DE), ²University of Glasgow, Department of Physics and Astronomy (UK). We demonstrate the generation of high quality Mathieu beams of various orders. The transversal field distributions of these non-diffracting beams enable us to create complex 3D particle structures in stereoscopic optical tweezers, which gives three-dimensional observation. [3469]

10:15  Microscopic orientation and sorting of biological objects with optical tweezers and forward scattered light
B. Landenberger¹, A. Rohrbach¹
¹Lab for Bio- and Nano-Photonics, University of Freiburg (DE), ²Centre for Biological Signalling Studies (bioS), University of Freiburg (DE). An inverted microscope-based setup is presented that allows manipulation with optical forces, multi-dimensional tracking, multi-spectral observation, and analysis of biological objects ranging in size from single suspension cells to small embryos, consisting of thousands of cells. [3315]

10:30  Microfluidic systems combined with optical micromanipulations and spectroscopy for live-cell analysis and sorting
Z. Pilat, A. Jondi, O. Samek, J. Ježek, M. Šerj, P. Zemánek, Institute of Scientific Instruments of the ASCR, v.v.i., Academy of Sciences of the Czech Republic (CZ). We have investigated a combination of optical trapping with microspectroscopic techniques and microfluidic chips for advanced biotechnological applications. [3486]

Room: Michelson

10:00  Low divergence Terahertz photonic wire laser
M. I. Amanti, G. Scala, F. Castella, M. Beck, J. Fäss, ETH Zurich, Institute for Quantum Electronics (CH). Edge emitting, terahertz quantum cascade photonic wire lasers, based on a third order Bragg grating are presented. Devices with a power consumption as low as 300 mW, with a single frequency output power of more than 1.5 mW in a single narrow spot are demonstrated. [3639]

10:15  A new material system for terahertz quantum cascade lasers: InGaAs/GaSb
C. Deutsch¹, A. Benz¹, K. Unterrein¹, P. Klang¹, H. Detz², M. Nobile³, A.M. Andrews², W. Schrenk², G. Strasser²
¹Vienna University of Technology, Photonics Institute (AT); ²Vienna University of Technology, Center for Micro- and Nanostructures and Institute for Solid-State Electronics (AT). We demonstrate terahertz quantum cascade laser devices based on the Aluminum free InGaAs/GaSb material system. Disk devices in a double-metal waveguide configuration show spectral emission between 3.6 and 4.1 THz and reach operating temperatures up to 105 K. [3543]

10:30  Performance of a compact, continuous-wave terahertz source based on a quantum-cascade laser
H. Richter¹, M. Greiner-Bair², S.G. Pavlov³, A.D. Semenov³, M. Wierdala⁴, L. Schottke⁴, M. Gielmier⁴, R. Hey⁴, H.T. Grafe⁴, M.-W. Hübers⁴
¹German Aerospace Center (DLR), Institute of Planetary Research (DE); ²Paul-Drude-Institut für Festkörperphysik (DE); ³Institut für Optik und Atomeik Physare, Technische Universität Berlin (DE). We report on the development of a compact, easy-to-use terahertz radiation source, which combines a quantum-cascade laser (QCL) with a compact, low-input-power Stirling cooler. [3377]

Room: Foucault

10:00  Wire cavity photonic crystal hybrid III-V laser on silicon wire
Y. Halamoo¹,², F. Raineri¹,², A. Bazin², T.J. Karle³, P. Monnier³, J. Sagnes⁴, G. Roelkens⁴, R. Roy⁴, ¹Laboratoire de Photonique et de Nanostructures, CNRS-UPR20 (FR), ²Photonics Research Group, IMEC/Ghent University (BE), ³Université Paris Diderot (FR). We report laser emission from hybrid III-V nanocavities on silicon on insulator waveguide. The cavity is optically pumped by the surface laser emission is coupled into the SOI wire and collected at its output. [3625]

10:15  High frequency GaAs nano-optomechanical disk resonator
L. Ding¹, C. Baker¹, P. Senellart², A. Leinen², S. Duc¹, G. Leo¹, I. Favero², ¹Laboratoire Matériaux et Phénomènes Quantiques, Université Paris-Diderot, CNRS (FR), ²Laboratoire Photonique et Nanostructures, LPN/CNRS (FR). We present a high quality optical/mechanical GaAs disk resonator for cavity nano-optomechanics experiments. We measure giant optomechanical coupling rate (up to 10GHz/nm) and high frequency (up to GHz) mechanical modes, both resulting from the resonator nano-scale dimensions. Motional sensitivity of 10-17 m/√Hz is obtained. [3397]

10:30  Ultra-sharp edge filtering in nanostructured photonic wire evidenced by delay measurement
A. Taitanou¹, J. Sagnes¹, R. Gabet², Y. Jaouen², H. Benisty², ¹CNRS-Laboratoire de Photonique et de Nanostructures (FR), ²TELECOM Paris Tech, ²IGS Laboratoire Charles Fabry, CNRS (FR). Within a suspended InP photonic wire, the periodically spaced nanotethers holding the wire behave as coupled resonators on a partially reflecting waveguide, creating an ultra-sharp filter edge. This complex resonant mechanism is investigated theoretically and evidenced experimentally using optical low coherence reflectometry. [3535]

Room: Newton

10:45 - 11:15 coffee break (exhibition hall)

Students presentations

10:00  Complete wavefront reconstruction at Infrared wavelength using speckle phase retrieval
V.A. Gózalez, T.J. Abregana, P.F. Almora, National Institute of Physics, University of the Philippines (PH). Reconstruction of an object wavefront at infrared wavelength (1024 nm) using a speckle based phase retrieval technique is demonstrated experimentally. Correlation of the reconstructions with those obtained using digital holography confirm the effectiveness of our technique. [3531]

10:15  Observation of the differences between scalar and rigorous calculation at CGHs in Twyman-Green interferometers for lens testing
W. Hoff, S. Gloubrecht, N. Lindlein, J. Schwider, University of Erlangen, Chair of Optics, Institute of Optics, Information and Photonics (DE). We investigate how differences between the scalar thin element approximation (TEA) and the rigorous calculation at computer generated holograms (CGHs) in Twyman-Green interferometers in null test configuration affect phase and intensity in the detector plane. The TEA and rigorous ray optics (ROM) are employed for the simulations. [3484]

10:30  On-line 4D microscopy of non-periodic changing surfaces using high speed white light interference microscopy
P.C. Montgomery, F. Anstotz, J. Montagno, Institut d’Électronique du Solide et des Systemes, Laboratoire Commun LIS-CNRS, UMR 7163 (FR). A 4D (3D+1) real time interference microscopy system has been developed based on a high speed camera coupled with a FPGA processor. Real-time 3D measurement at up to 25/1 allows the characterisation of changing microscopic surfaces. [3471]

10:45  3D reconstruction in digital holographic microscopy
F. Jour¹, F. Verpilm¹, M. Attar³, M. Gross¹, ¹Laboratoire Kastler Brossel, UMR 8552 CNRS ENS (FR), ²Institut Langevin, ESPCI, ¹10 Rue Vauquelin (FR). We describe an original method able to perform the holographic reconstruction in Digital Holographic Microscopy (DHM) without distortion of the 3D image in the longitudinal z direction. This method is well suited to reconstruct the 3D image the wavefield diffracted by an object. The reconstruction parameters can be calculated from the holographic data, without calibration of the setup. Reconstruction of a 3D wavefield diffracted by a 200 nm gold particles under TIR illumination is presented as an example. [3460]
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<th>Room: Huygens</th>
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<td><strong>10:00</strong></td>
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<td><strong>Student presentation</strong></td>
<td><strong>Spectral and spatial transformation of a pulse probing a filament created in a crystalline target by femtosecond radiation</strong> R.V. Volok, A.B. Savel’ev; M.V. Lomonosov Moscow State University, Physical Department and International Laser Centre (RU). The results on optical probing of a filament created in a KDP crystal by 50 fs pump pulses at the wavelength of 800 nm are presented. The Raman sidebands in the spectrum of the scattered 400 nm probe radiation are observed. Their spectral shift corresponds to an Ã phonon excited during the pump pulse filamentation. [3446]</td>
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**Ultra-broad optical gain and two-colour amplified spontaneous emission in binary blends of insulated molecular wires** M.M. Mroz, T. Brevelli, T. Virgili; G. Fiarazzini, A. Poliarchi, H.L. Anderson; F. Cacialli, G. Lanzani; 1 Dipartimento di Fisica, Politecnico di Milano (IT); 2 London Centre for Nanotechnology, and Department of Physics and Astronomy, University College London (UK); 3 IFN-CNR c/o Politecnico di Milano, Dipartimento di Fisica (IT); 4 Department of Chemistry, University of Oxford, Chemistry Research Laboratory (UK); 5 Dipartimento di Scienze dei Materiali, Università di Milano-Bicocca (IT); 6 Center for Nano Science and Technology IIT@Polimi (IT).

Here, we show properties of conjugated polyrotaxanes combine into photonic application ultra-broad band optical gain in a binary polymer blend that can be further exploited for two-colour lasing. We study the optical properties of a blend of polyfluorene and polyrotaxane by means ultrafast spectroscopy and ASE experiment. [3375] |

**Composite PPV-nanoparticle distributed feedback lasers** F. Scotognella, 1 D.P. Puzio, 2 M. Zavelani-Rossi, 3 R. Tubino, 2 G. Lanzani, 2, G.A. Ozirì, 1 Dipartimento di Fisica, Politecnico di Milano (IT); 2 Department of Chemistry, University of Toronto (CA); 3 Dipartimento di Scienze dei Materiali, Università di Milano Bicocca (IT).

In this study, we have fabricated a poly (phenylene vinylene) (PPV) infiltrated nanoparticle one-dimensional photonic crystal and we have observed laser emission by pumping the PPV in this photonic structure with a pulse Ti:Sapphire laser. We have observed laser emission by single-photon and two-photon pumping. [3391] |

**10:15** | **10:15** |
| **Composite PPV-nanoparticle distributed feedback lasers** | **High-energy amplification scheme for near-single-cycle pulses at 2 μm based on angular dispersion** J.A. Fülöp, T. Trinn, Gy. Tóth, J.A. Fülöp, T. Trinn, Gy. Tóth, J. Hebling, University of Pécs, Department of Experimental Physics (HU).

We show that energy-scalable optical parametric amplification is possible in LiNbO3 with extremely increased bandwidth in the infrared by using an angularly dispersed signal beam. This scheme allows amplification of near-single-cycles pulses. [3650] |

**10:30** | **10:30** |
| **Dye-doped polymer laser in self-formed waveguide with highly efficient Fabry-Perot cavity** K. Yamazaki, M. Ita, S. Sugimoto, T. Morishita, K. Oey, Kyoto Institute of Technology, Department of Electronic (JP).

A polymer-based laser for integrated optoelectronics was fabricated with a self-written active waveguide technique. For this laser device, we have succeeded in fabrication of an efficient Fabry-Perot cavity, and a drastic reduction in the lasing threshold was achieved. [3119] | **Generating ultra-short energetic pulses with cascaded soliton compression in lithium niobate crystals** B.B. Zhou, 1 A. Chong, 2 F.W. Wise, 2 M. Bache, 1 Technical University of Denmark, DTU Fotonik (DK); 2 Cornell University, Dept. Applied and Engineering Physics (US).

By launching energetic femtosecond pulses in a lithium niobate crystal, the phase mismatched second-harmonic generation process compresses the 50 fs input pulse at 1250 nm to 30 fs through a soliton effect. [3371] |

**10:45 - 11:15 coffee break (exhibition hall)**

### Notes

**Ultra-broadband optical gain and two-colour amplified spontaneous emission in binary blends of insulated molecular wires**

M.M. Mroz, T. Brevelli, T. Virgili; G. Fiarazzini, A. Poliarchi, H.L. Anderson; F. Cacialli, G. Lanzani; 1 Dipartimento di Fisica, Politecnico di Milano (IT); 2 London Centre for Nanotechnology, and Department of Physics and Astronomy, University College London (UK); 3 IFN-CNR c/o Politecnico di Milano, Dipartimento di Fisica (IT); 4 Department of Chemistry, University of Oxford, Chemistry Research Laboratory (UK); 5 Dipartimento di Scienze dei Materiali, Università di Milano-Bicocca (IT); 6 Center for Nano Science and Technology IIT@Polimi (IT).

Here, we show properties of conjugated polyrotaxanes combine into photonic application ultra-broad band optical gain in a binary polymer blend that can be further exploited for two-colour lasing. We study the optical properties of a blend of polyfluorene and polyrotaxane by means ultrafast spectroscopy and ASE experiment. [3375]
12:45 - 13:45 lunch break (exhibition hall)

13:45 - 15:15 POSTER SESSION I (exhibition hall) and exhibition only time
For the poster presentations please see pages 76 to 88.

15:15 - 17:35 GRAND CHALLENGES OF PHOTONICS
Room: Amphithéâtre Fresnel

15:15 Introduction

15:20 Invited Talk
Inkjet printing in device and materials discovery
G.E. Jabbour, Y. Yoshioka, H. Haverinen; University of Oulu (FI).
Inkjet printing can be a powerful tool in device and materials discovery in many areas including electronics, photonics, biology, and medicine, to mention a few. In this talk we will discuss the use of inkjet to control oxidation/reduction reactions on a conducting/insulating surface in order to obtain various values of sheet resistivity, and how it relates to device fabrication. Moreover, we will show the power of this technique in generating combinatorial libraries of sheet resistivity that can be accessed at will, and specified at any desired location on the substrate with impressive accuracy. Such capability allows for the fabrication of various electrical elements such as variable resistors, strip heaters, etc., monolithically integrated on the same substrate. It is also beneficial in image storage for security applications or identification on smart packages. Another area that recently benefited from the use of inkjet printing is displays. Recent work shows that inkjet printing technique is an indispensable approach in RGB patterning of quantum dots LEDs. In fact, use of inkjet allowed for the first time the demonstration of DC driven high density RGB pixel array (QVGA format). Time permitting; we will also discuss a simple inkjet process to develop highly conducting textiles based on PEDOT (polypyrrole) monomer via a small molecule oxidizer. The resulting fabric is highly conductive with sheet resistivity values less than 20 Ω/sq, durable, and washable. [3927]

15:50 Invited Talk
Light in femtoseconds: the making of molecular movies with ultrashort lasers
L. Bañares, Departamento de Química Física, Facultad de Ciencias Químicas, Universidad Complutense de Madrid (ES).
The natural time scale for physical and chemical change in molecules is from tenths to hundreds of femtoseconds. Physical change in molecules is related among others with molecular vibration and energy relaxation. Chemical change deals with bond breaking and bond forming in chemical reactions. The last two decades have witnessed the advent and development of ultrafast laser technologies. One of the most recognized applications of these laser technologies to Chemistry has given rise to the birth of Femtochemistry, which is nowadays a scientific discipline by its own merits. Femtochemistry was awarded the Nobel Prize in Chemistry in 1999 and the laureate was Prof. Ahmed H. Zewail (CalTech, Pasadena, US) who is the pioneer in the development of the field. In this contribution we will show recent experiments where fast molecular processes are directly visualized through a novel combination of ultrashort (femtosecond) lasers and (ion and photoelectron) imaging techniques. [3918]
### Molecular control for organic photonics

**D.D.C. Bradley**, Department of Physics and Centre for Plastic Electronics, Imperial College London (UK).

This talk will focus on the influence of molecular structure (chemical and physical) on the optical properties of organic semiconductor materials. In particular, I will discuss approaches to enhancing the potential of organic materials for application in photonics. Recent results will be presented from work addressing materials development for electrically pumped organic lasers, a metamaterials inspired approach to optical structure fabrication and the use of organic gain media for plasmonic amplifier structures. [3912]

**Room:** Amphithéâtre Fresnel

### Light trapping in thin-film solar cells

**A. Polman**, Center for Nanophotonics, FOM-Institute AMOLF (NL).

In this presentation I will describe how light trapping in thin-film solar cell can be achieved using suitably engineered metal nanostructures. When integrated with thin-film solar cell designs, these can strongly increase the solar cell efficiency and reduce its thickness. I will review three light trapping geometries indicated schematically below. All designs use the controlled scattering and/or optical near field enhancement near due to the excitation of surface plasmons in metal nanoparticles to enhance the absorption of light in a thin-film solar cell. [3917]

### Geometry and light

**U. Leonhardt**, School of Physics and Astronomy, University of St Andrews (UK).

The lecture explains how ideas of general relativity can become practically useful in electrical and optical engineering and how some of the elusive physics of the event horizon can be demonstrated in the laboratory. The lecture focuses on three key examples, invisibility cloaking, perfect imaging and horizons, that have one important theoretical aspect in common: they connect Maxwell’s electromagnetism and Einstein’s general relativity, light with geometry. [3916]
Laser-based nanotechnologies for biomedical applications
B.N. Chichkov, Laser Zentrum Hannover e.V. (DE).
Our recent progress in the development of laser-based nanotechnologies for applications in photonics and regenerative medicine will be reported. Fabrication of nanophotonic components by two-photon polymerization (2PP) of photostructurable sol-gel materials will be discussed. 2PP allows the fabrication of two- and three-dimensional structures with a resolution well beyond the diffraction limit. The polymerization process is initiated when the beam of an ultrafast, infrared laser is tightly focused into the volume of a transparent, photosensitive material. Two-photon absorption takes place within the focal volume; by moving the focused laser beam within the material, fully 3D structures can be fabricated. Possible applications of this technique for the fabrication of photonic crystals, metamaterials, plasmonic components, and biomedical devices will be discussed. [3885]

9:30 Student presentation
Artificial biopolymer networks with optical trapped anchor points
D. Ruß, A. Rohrbach, Lab for Bio- and Nano-Photonics, University of Freiburg (DE).
Optical traps represent a versatile and flexible tool to manipulate many particles in parallel and in three dimensions. Therewith, it is possible to generate an array of anchorpoints for artificial polymer networks. In particular, microtubules play a key role in cellular processes like cell division and mechanotransduction. We aim at building up synthetic biopolymer networks using time-multiplexed optical tweezers for both 3D force generation and measurements. [3278]
### Thursday, 28 October

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<td>9:00 - 10:30</td>
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<tr>
<td>Organic photovoltaic materials and devices</td>
<td>Spatial and spatiotemporal effects</td>
<td>Photonics for solar energy</td>
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<td>Session chair: W. Freude</td>
<td>Session chair: G. Steinmeyer</td>
<td>Chairs: M.L. Calvo &amp; D.T. Moors</td>
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<td>Karlsruhe Institute of Technology (KIT) (DE)</td>
<td>Max Born Institut (DE)</td>
<td>1ICO President (ES); 2ICO Elected Vice-President, Chair of 1 ICO Committee for Regional Development (US)</td>
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#### 9:00 Invited Talk

**Photogeneration and ultrafast dynamics of excitons and charges in polymer/fullerene/quantum dot blend films**

L.D.A. Sappa; Optoelectronic Materials Section, Department of Chemical Engineering, Delft University of Technology (NL).

Photogeneration and decay of excitons and charges in the conjugated polymer poly(3-hexylthiophene) (P3HT) with PCBM or PbS quantum dots as electron acceptors were studied with ultrafast laser spectroscopy. Insights in the mechanism of charge carrier formation (via carrier multiplication) are discussed. (3295)

<table>
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<tr>
<th>9:30 Real time studies during coating and post-deposition annealing in organic semiconductors for solar cell applications</th>
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<tbody>
<tr>
<td>M. Campoy-Quiles1, A. Roigé2, C. Müller1, M. Schmidt1, D. Nassaryov1, I. Burgués1, M.I. Alonso1, J.O. Osad1, A.R. Galli1, O. Inganäs1, M. Grätzel1; 1Science Material Institute of Barcelona (ICMAB-CSIC), Campus UAB (ES); 2MATSAS 2000, AIE (ES); 3Biomolecular and Organic Electronics, FM Linköpings University (SE).</td>
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The small -Van der Waals- interaction between organic molecules enables them to rearrange into a variety of film morphologies, including glassy and semi-crystalline phases, such that the final morphology strongly depends on the specific processing conditions and post-deposition treatments. Moreover, for the case of organic solar cells, the morphology at the nanoscale of donor acceptor mixtures has been found to be one of the key parameters influencing their performance. Understanding how to monitor and control the morphology is, therefore, a major issue in the field. (3882)

### 9:00 Invited Talk

**Spatial soliton formation in erbium doped lithium niobate driven by a self-induced fluorescence beam**

M. Alonzo1, F. Devaux2, A. Toncelli1, N. Argiolas3, M. Bazzan1, A. Toncelli1, E. Fazio1; 1Ultrafast Photonics Laboratory, Dipartimento di Energetica, Sapienza Università di Roma and CNISM (IT); 2Département d’Optique, Institut Femto-ST, Université de Franche-Comté (FR); 3 Dipartimento di Fisica E. Fermi, Università di Pisa and NEST-CNR (IT). We report experimental and numerical results about spatial optical soliton formation in erbium doped lithium niobate at 980nm. It will be shown that a self-induced fluorescence in green is responsible for light self-confined. Luminescence role for space charge field stabilization and bending reduction will be analyzed. (3596)

<table>
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<th>9:15 Cavity solitons in a monolithic vertical-cavity laser with saturable absorber</th>
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<tr>
<td>S. Barbay1, T. Elass1, K. Meunier1, G. Beaudoin1, I. Sagnes1, R. Kuszelewicz1, D. Nassyrov1, J.O. Ossó1, M. Garrión1, A. Roigé2, I. Sagnes1, R. Kuszelewicz1, D. Nassyrov1, J.O. Ossó1, M. Garrión1, F. Pardo1, I. Laperne1, N. Argiolas3, M. Bazzan1, A. Toncelli1, E. Fazio1; 1Labouratoire de Photonique et de Nanostructures, CNRS-UFR20 (FR); 2Centro de Investigación en Física de Materiales, Universitat de Barcelona (ES); 3Complutense University of Madrid, Ciudad Universitaria (ES).</td>
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We present a new type of micro-photonic waveguide based on the subwavelength grating effect. We demonstrate how these waveguides can be used to make compact and highly efficient photonic devices, including a fibre chip coupler with an efficiency of 93%/0.3 dB and a miniature planar waveguide spectrometer chip with an operation bandwidth of 170 nm with a device size of only ~100 mm x 160 mm. (3199)

<table>
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<th>9:30 Optical nanoantennas for high-efficient ultra-thin solar cells</th>
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<tr>
<td>S. Collin1, C. Collin1, C. Sauvan1, I. Massia1, F. Pardo1, N. Péré1, Laperne1, P. Ghenuche1, N. Bardou1, P. Lalanne1, J.-L. Pelouard1; 1Laboratoire de Photonique et de Nanostructures (LP-CNRS) (FR); 2Laboratoire Charles Fabry de l’Institut d’Optique, CNRS, Univ. Paris-Sud (FR).</td>
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We propose new concepts for light trapping in ultra-thin solar cells. It is shown numerically that optical nanoantennas can lead to broadband absorption in 30nm-thick GaAs solar cells, with 17.5% energy conversion efficiency. (3488)
Thursday, 28 October

Room Lippmann

9:45
A soft lithographic technique for replicating hydrophobic areas patterned by a femtosecond laser on PMMA
C. De Marco1, S.M. Eaton2, S. Turri1, M. Levi1, R. Rampini1, C. Cerulli1, R. Chellame1; Politecnico di Milano, Dipartimento di Chimica, Materiali e Ingegneria Chimica „Giulio Natta” (IT); IFN-CNR, Dipartimento di Fisica, Politecnico di Milano (IT).
We demonstrate that femtosecond laser ablated patterns of hydrophobic areas on a poly(methyl methacrylate) master can be replicated using a new solvent-resistant polymer. This simple and low cost method can be applied to obtain passive valves and mixers for handling fluids in microfluidic channels. [3620]

10:00
Student presentation
Two-dimensional dielectrophoretic particle trapping in a hybrid PDMS/crystal system
We present two-dimensional dielectrophoretic particle trapping on a photorefractive surface. Highly modulated electric fields are generated by structuring the material with an amplitude spatial light modulator. We demonstrate periodic and arbitrary alignment patterns in air and trapping in a microfluidic environment. [3374]

10:15
High speed tracking of protein bodies revealing the transport mechanism in living plant cells
C. Lopez-Quisada1, M. Joseph1, M. D. Ludevid2, E. Martin-Badosa1, M. Montes-Ustategui1; 1Universitat de Barcelona, Optic Trapping Lab - Grupo Biótica, Departamento de Fisico Aplicada i Òptica (ES); 2Centre de Recerca en Agrigenòmica – CSC-IBIA (CBING), Departament de Genètica Molecular (ES).
In this work, we present a fast speed tracking of vesicles, named protein bodies, which is addressed to study the nature of the intracellular transport mechanism in living tobacco cells. [4025]

Room Michelson

9:45
Student presentation
Terahertz time domain imaging of clay artefacts
J. Labauze1,2,3, J. Jackson1, K. Fuku- nagai3, M. Menzi3, G. Mourou1; 1École polytechnique, Institut de la Lumière Extrême (FR); 2Centre de recherche et de restauration des musées de France (FR); 3National Institute of Information and Communications Technology (JP).
Terahertz time-domain spectroscopy can be used to image optically opaque objects or detect different materials. In this presentation we propose to use terahertz to image in transmission and in reflection clay artefacts. [3442]

10:00
Nondestructive terahertz pulse imaging for cultural heritage conservation: a survey
J.B. Jackson1, J. Labauze1, I.N. Dol- ling1, J. White1, L. D’Alessandro2, M. Menzi2, G.A. Mourou1; 1ENSTA-École Polytechnique, Institut Lumière Extrême (FR); 2PicoMetrix-Advanced Photonics, Inc (US); 3University of Chicago Oriental Institute (US); 4Center for Research and Restoration of the Museums of France (FR).
Terahertz pulsed imaging has been used to investigate a broad variety of cultural heritage-related objects including: drawings, papyrus texts, wood panels, frescoes, mosaics, marble and ceramics. [3560]

10:15
Application of terahertz spectroscopy to cancer diagnosis
M.-A. Broc1, E. Forma1, M. Seki- ne2, A. Yasuda1, Y. Ishii1; Life Science Laboratory, Advanced Materials Laboratories, Sony Corporation (JP); 2Department of Human Pathology, Tokyo Medical and Dental University (JP).
We report on terahertz (THz) time-domain spectroscopy (TDS) imaging of 10-μm thick histological sections. The links between cellular structures and specific THz information is investigated by comparing visible microscope images with segmented THz images. [3247]

Room Foucault

9:45
Controlling light emission with optical antennas
A. DeVries, B. Stuart, N. Bonod, Institut Fresnel, Domaine Universitaire de Saint Jéréme (FR).
This talk is dedicated to the control through compact optical antennas of light radiated by single emitters. We will present the concept of metallo-dielectric antenna which permits to conceive compact, ultra radiative and highly directive antennas. [3356]

10:00
Colloidal quantum dots as probes of excitation field enhancement in photonic antennas
H. Aouan1, S. Ishiakawa2, D. Gachet1, E. Devaux2, T.W. Ebbesen3, H. Rigneault1, D. Oran1, J. Wengert1; 1Institut Fresnel, Aix-Marseille Université, CNRS, 346 s de S Jérôme (FR); 2Département of Physics of Complex Systems, Weizmann Institute of Science (IL); 3Laboratoire de Physique et des Nanostructures, CNRS (FR).
Optical nanoantennas are essential devices to manipulate light at the nanoscale. Experimental characterization of such structures is highly needed to fully understand and optimize the antenna’s design. We present here a novel approach to measure the antenna amplification by monitoring the transient emission dynamics of Qdots. [3263]

10:15
Digital holography for the three-dimensional mapping of the light scattered by nanoantennas
S.Y. Suck1, S. Collin1, N. Bardou1, Y. de Wilde1, G. Tessier1; 1Institut Langevin, Laboratoire d’Optique, CNRS UMR 7640 (FR); 2Laboratoire de Photonique et de Nanostructures (LPN-CNRS) (FR); 3Fondation Pierre-Gilles de Gennes pour la Recherche (FR).
Full field digital heterodyne holography is used to study the scattered electromagnetic field of optical antennas. After a spectroscopic characterization, the three-dimensional scattering pattern of various gold nanoantennas was measured for wavelengths in and out of resonance. [3482]

Room Newton

9:45
Student presentation
Time-resolved optical emission analysis and growth of BiSrCaCuO+δ thin films
Time-resolved optical emission spectroscopy (TROES) was performed during infrared pulsed laser deposition of BiSrCaCuO+δ thin films. TROES reported the presence of excited neutral, ionized and excited species of BiSrCaCuO plasma. Smooth, highly c-axis oriented films were obtained after heat treatment. [3202]

10:00
Tomographic diffractive microscopy: towards high resolution 3D imaging in the multiple scattering regime
Y. Ruot1, E. Mestres2, G. Maire1, P. Chaumet1, H. Giovannini1, K. Beck- bir1, A. Tanoue2, A. Sentenac1; 1Institut Fresnel, UMRO 6153 CNRS, Aix-Marseille Université, Domaine Universitaire de Saint-Jérôme (FR); 2Laboratoire de Photonique et de Nanostructures, CNRS (FR).
We have developed a tomographic diffractive microscope and a nonlinear inversion procedure to reconstruct the permittivity map of three-dimensional objects in the multiple scattering regime, where linear scattering models cannot be applied, with a resolution well beyond the Rayleigh criterion. [3553]

10:15
A novel length measurement interferometer based on a femtosecond optical frequency comb introduced multi-pulse trains’ interference
D. Wei, S. Takahashi, K. Takamatsu, H. Matsumoto; The University of Tokyo, Department of Precision Engineering (JP).
A novel executable interferometric scheme based on a femtosecond optical frequency comb (FOFC) introduced multi-pulse trains’ interference is proposed to achieve length measurement of meter order with an accuracy of nanometer order. The result of the length measurement experiment will be presented. [3209]

10:30 - 11:00 coffee break (exhibition hall)
**Room: Huygens**

**9:45 Student presentation**

**The use of dynamic probes to study the drying and crystallization in P3HT:PCBM thin films**


1. Department of Physics & Astronomy, University of Sheffield (UK); 2. Department of Chemical Engineering, University of Sheffield (UK); 3. Department of Physics, University of Cambridge (UK); 4. Department of Physics & Astronomy, Cardiff University (UK);

A combination of spectroscopic ellipsometry (SE) and grazing incidence x-ray scattering (GI-XS) are used to probe structure formation in thin films of an organic semiconductor blend in situ during the film casting process. This information is vital for designing future processing routes which exploit the favourable properties of these materials. [3890]

**10:00 Student presentation**

**Organic photodetectors based on squaraine/pcbm bulk-heterojunction**

M. Binda, A. Iacchetti1,2, D. Notari1,2, M. Sampietro, L. Beverino1;

1. Politecnico di Milano, Dipartimento di Elettronica e Informazione (IT); 2. CNST-IT at Politecnico di Milano (IT); 3. University of Milano-Bicocca, Department of Materials Science and INSTM (IT);

Organic photodetectors have been realized exploiting squaraine dyes in order to harvest the light in the near-infrared range of the spectrum. High quantum efficiency and fast response have been achieved by employing the squaraine dye in bulkheterojunction with [6,6] phenyl C61 butyric acid methyl ester. [3515]

**10:15 Preparation of sub-micron structured films of conjugated polymers and their use for photovoltaic device applications**

J. Fariah1,2, A. Charas1, Q. Ferreira, R. Di Paola, J. Morgado1,2, Instituto de Telecomunicações (PT); 3. Centro de Química Estrutural, Instituto Superior Técnico (PT); 4. Departamento de Engenharia Química e Biológica, Instituto Superior Técnico (PT);

Cross-linked films of conjugated polymers with sub-micron structured surfaces are prepared from blends with polystyrene. These films are used to prepare photovoltaic cells and their performance is related to the dimensions of the polymer surface patterns. [3193]

**10:30 - 11:00 coffee break**

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**Amphithéâtre Fresnel**

**9:45 Student presentation**

**Increased performance of thin film silicon photovoltaic modules through optical confinement strategies.**

M. Fonrodona, J. Andreu, T. Solar Global, S.A., Technology Transfer Centre (ES);

The main objective of photovoltaic technology is cost reduction and the main driver for cost reduction is to increase efficiency. Better exploitation of light accomplished via optical confinement strategies is a clear road ahead to fulfill this goal. [3319]

**10:00 Tom 6**

**Invited Talk**

**Vortex lattices in the coherently pumped polariton microcavities**

A.V. Gorbatch, R. Hartley, D.V. Skryabin, Centre for Photonics and Photonic Materials, Department of Physics, University of Bath (UK);

We propose a new class of vortex lattices supported by the parametric conversion of polaritons in wide aperture semiconductor microcavities operating in the strong coupling regime. We present numerical and analytical results confirming the existence and robustness of the polaritonic vortex lattices and discuss their melting scenarios. [3361]

**10:15 Tom 6**

**Propagation effects in THZ generation by ionizing two-color laser pulses**

C. Köhler1, W. Kuehn1, L. Babushkin2, S. Skupin1, L. Bergé3, K. Reimann3, A.V. Gorbach, R. Hartley, D.V. Skryabin, Centre for Photonics and Photonic Materials, Department of Physics, University of Bath (UK);

We present a combined theoretical and experimental study of spatio-temporal propagation effects in THz generation in gases using two-color ionizing laser pulses. (3+1)-dimensional simulation results agree well with experimental measurements and clarify the physical mechanisms responsible for THz emission. [3284]

**10:30 - 11:00 coffee break**

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**Room: Maiman**

**10:15 Photonic structures to improve solar cells efficiencies**

J. Le Roux, C. Alfonso, M. Amin Ali, D. Barakel, D. Duché, L. Escoubas, M. Goihhanou, L. Roussel, J-J. Simon, Aix-Marseille University, Institut Matériaux Microélectronique Nanosciences de Provence-IM2NP, CNRS-LUMI 6242 (FR);

In order to significantly increase efficiencies of photovoltaic solar cells, optical and electrical performances must be simultaneously improved. Photonic structures such as photonic crystals or nanostructures are a very promising way to address this problem. [3459]
Resonance waveguide gratings
M. Kuittinen; Department of Physics and Mathematics, University of the Eastern Finland (FI).

Dielectric sub wavelength resonant waveguide gratings (RWGs) were designed and fabricated to act as reflectors. Furthermore, the usage of RWGs in enhancing the second harmonic generation, the fluorescence signal and the Raman scattering was considered. [3395]

12:30 - 13:30 lunch break
13:30 - 15:00 POSTER SESSION II (exhibition hall) and exhibition only time
For the poster presentations please see pages 76 to 88.

Ultracompact silicon/polymer laser with an absorption-insensitive nanophotonic resonator
T. Stöferle1, N. Moll1, T. Wahlbrink2, J. Bolten2, T. Mollenhauer2, U. Scherf3, R.F. Mahrt1; 1IBM Research – Zurich (CH); 2Advanced Microelectronic Center Aachen (AMICA) AMO GmbH (DE); 3Macromolecular Chemistry Group and Institute for Polymer Technology, Bergische Universität Wuppertal (DE).

Visible laser emission is observed from two silicon subwavelength-sized high index contrast gratings with embedded polymer gain material. The size of the laser is reduced by an order of magnitude compared to established designs based on photonic bandgap structures. This extends silicon photonics into the visible wavelength range. [4006]

Optofluidics

Optofluidics refers to a class of adaptive optical circuits that integrate optical and fluidic devices. Familiar examples include liquid crystals and dye lasers. The introduction of liquids in the optical structure enables fine-tuning and reconfiguration of circuits so they can perform tasks optimally in a changing environment. We will discuss how the emergence of fluidic transport technologies at the micron and nanometer level opens possibilities for novel adaptive optical devices. [3879]

All-optical switching in silica microspheres coated by nonlinear polymer
I. Razdolskiy1, S. Beresnich2, G. Nuezi Conti3, S. Pellip1, T.V. Murzina1, G.C. Rigolin2, S. Savio1,1Department of Physics, Moscow State University (RU); 2IFAC-CNR, Institute of Applied Physics (IT); 3Museo storico della Fisica e Centro Studi e Ricerche «E. Fermi » (IT).

Nonlinear Kerr switching of the whispering gallery modes (WGM) excited in silica microspheres covered by a nonlinear polymer are studied. The nonlinear switch of WGM of 2 GHz exceeds the thermally induced effect by nearly an order of magnitude in the vicinity of two-photon p-p* polymer transition at the pump radiation wavelength. [4005]
Distance metrology for space missions using femtosecond laser pulses


The frequency comb of a femtosecond laser source provides a wavelength ruler that enables multi-wavelength light interferometry for real-time measurement of long distances. In addition, femtosecond laser pulses allow time-of-flight measurement with improved precision in comparison to conventional lasers. This unique remote ranging capability of femtosecond lasers is investigated for next-generation space missions deploying multiple satellites for synthetic aperture imaging. The position and orientation of each satellite is to be precisely measured and controlled with respect to the master satellite to realize formation flying in space. [4009]

Amplified Spontaneous Emission from planar polymer waveguide under cw-pumping

M.M. Mroz¹, F. Scotognella¹, M. Zavelani-Rossi¹, G. Lanzani²; ¹Dipartimento di Fisica, Politecnico di Milano (IT); ²Center for Nano Science and Technology of IIT@Polimi (IT).

We demonstrate amplified spontaneous emission (ASE) from MEH-PPV in a slab waveguide under cw-pumping. We observe line narrowing of the emission spectrum for pump intensities above 0.3 mW/cm². ASE, collected at the edge of the waveguide, is centred at 603 nm with a FWHM of 23 nm and shows high polarization contrast [4022]

Distance metrology for space missions using femtosecond laser pulses


The frequency comb of a femtosecond laser source provides a wavelength ruler that enables multi-wavelength light interferometry for real-time measurement of long distances. In addition, femtosecond laser pulses allow time-of-flight measurement with improved precision in comparison to conventional lasers. This unique remote ranging capability of femtosecond lasers is investigated for next-generation space missions deploying multiple satellites for synthetic aperture imaging. The position and orientation of each satellite is to be precisely measured and controlled with respect to the master satellite to realize formation flying in space. [4009]
### Thursday, 28 October

#### Room: Lippmann

**16:00 - 17:00**

**Perspectives on biophysical dynamics, kinetics and imaging**

Session chair: H. Schmidt
University of California (US)

**16:00**

Student presentation

Following translation kinetics using quantum dots

D. Dulin, A. Le Gall, N. Soler, C. Gaudin, N. Westbrook, P. Bouyer, D. Fourmy, K. Perronnet, S. Yoshizawa; Laboratoire Charles Fabry de l’Institut d’Optique, CNRS et Université Paris Sud 11 (FR); Laboratoire de Chimie et Biologie Structurales ICSN-CNRS (FR).

We present a study of the protein synthesis translation at the single molecule level. Kinetics of protein synthesis could be monitored from initiation to termination using an appropriate surface chemistry to attach ribosomes tagged with a quantum dot. [3489]

**16:15**

Student presentation

Photonic force based investigations of intracellular molecular motor dynamics

F. Kohler; A. Rohrbach; Lab for Bio- and Nano-Photonics, University of Freiburg (DE); Centre for Biological Signalling Studies (biass), University of Freiburg (DE).

We use photonic force microscopy (PFM) with 3D back focal plane interferometry to investigate different mechanical concepts of phagocytes to take up 1 μm beads. One interesting concept of these cells is the usage of filopodia. Discrete steps several nm were measured during filopodia retraction likely belonging to molecular motors. [3312]

**16:30**

Student presentation

Interaction dynamics of colloidal particles in scarring line optical tweezers

B. Tränkle, A. Rohrbach; University of Freiburg, Lab for Bio- and Nano-Photonics (DE).

We have established a method for 3D tracking of diffusing spheres at high frequencies and nanometer precision. The dynamic interaction of at least 2 particles diffusing within a confined volume can be studied. [3245]

#### Room: Michelson

**16:00 - 17:00**

**Thz spectroscopy of organic and biological material**

Session chair: K. Tanaka
Kyoto University (JP)

**16:00**

**INVITED TALK**

Terahertz measurements of the peptide dynamical transition

D.K. George, J.-Y. Chen, Y. He; A.G. Markels; SUNY Buffalo, Physics, Buffalo (US); Washington State University, Institute for Space Physics (US); SUNY Buffalo, Chemistry (US).

Temperature dependent terahertz time domain spectroscopy measurements are made on a series of biomolecules. The so-called dynamical transition is present in peptides down to pentamers, but is no longer present for smaller peptides. The transition changes significantly with ligand binding to larger proteins. [3575]

**16:30**

**Terahertz spectroscopy of proteins**

J. D. Schmid, J.K. Homola, P. Pechal, M. Atlan; Laboratoire Charles Fabry de l’Institut d’Optique, CNRS et Université Paris Sud 11 (FR); Laboratoire de Chimie et Biologie Structurales ICSN-CNRS (FR).

Temperature dependent terahertz time domain spectroscopy measurements are made on a series of biomolecules. The so-called dynamical transition is present in peptides down to pentamers, but is no longer present for smaller peptides. The transition changes significantly with ligand binding to larger proteins. [3575]

#### Room: Foucault

**16:00 - 17:00**

**Subwavelength waveguiding**

Session chair: P. Lalanne
Institut d’Optique (FR)

**16:00**

**INVITED TALK**

Kerr shutter and power equalizer using polarization rotation in silicon waveguides

I.D. Rukhlenko, L.I. Garanovich, M. Premaratne, A.A. Sukhorukov, G.P. Agrawal; Y.S. Kivshar; Advanced Computing and Simulation Laboratory (A¥C), Department of Electrical and Computer Systems Engineering, Monash University (AU); Nonlinear Physics Centre, Research School of Physics and Engineering, Australian National University (AU); Institute of Optics, University of Rochester (US).

We theoretically analyze nonlinear polarization rotation in silicon waveguides due to the Kerr-induced self- and cross-mode phase modulation (SPM and XPM). We derive analytical expressions for transmittance of the Kerr shutter and power equalizer operating in the continuous-wave (CW) regime and use them to optimize the transmission. [3289]

**16:15**

Single polarization transmission in nano-wall supported silicon wire waveguide

W. Zhang, J.R. Cheng, Y. Wang, Y.-D. Huang, J.-de Peng; Electronic Engineering Department, Tsinghua University (CN).

A novel nano-wall supported silicon wire waveguide is proposed. Theoretical analysis and experimental results demonstrate that it only supports quasi-TE mode transmission, showing its potential in low loss silicon based polarization integrated components. [3327]

**16:30**

Experimental demonstration of coupling to silicon photonic wires using a grating coupler formed by subwavelength structures

J.H. Schmidt, P. Cheben, A. Lapointe; B. Bedard, R. Holm; L. Molina-Fernández; S. Janss; A. Deléglé; A. Danish; B. Lamontagne; R. Mo; D.-X. Xu; Inst. for Microstructural Sciences, National Research Council (CA); Dept. Ingeniería de Comunicaciones, ETIS, Telecommunicación, Universidad de Malaga (ES).

We present experimental results on a novel fiber-chip grating coupler for silicon photonic wire waveguides. By using subwavelength grating structures, which act as an averaged effective medium inside the grooves of the diffraction grating, the grating strength can be varied continuously to optimize the mode overlap of the diffracted beam with the fiber mode. Grating couplers and photonic wire waveguides are fabricated in a single etch step. We have measured maximum fiber-to-photonic wire coupling efficiencies of approximately 40% for the transverse magnetic (TM) mode. [3344]

#### Room: Newton

**16:00 - 17:00**

**Biological applications**

Session chair: S. Pell
Istituto di Fisica Applicata (IFAC-CNRS) (IT)

**16:00**

**INVITED TALK**

Optical coherence tomography in medicine and art conservation

A. Kovaleczky; Institute of Physics, N. Copernicus University (PL).

Optical coherence tomography - its physical foundations, instrumentation and requirements to create cross sections of objects that weekly scatter and weakly absorb light is discussed. Applications in medicine and art conservation will be demonstrated. [3241]
Effects of local Coulomb field on charge generation in P3HT-based solid state dye-sensitized solar cells A. Abrusci, R. Sal Santosh Kumar, A. Petrozza, H.L. Smith, University of Oxford, Department of Physics (UK). “Center for Nano Science and Technology of IIT@Polimi” (IT). Currently, dye-sensitized solar cells (DSSC) are a realistic option for converting light to electrical energy. Hybrid architectures offer a vast materials library for device optimization, including a variety of metal oxides, organic and inorganic sensitizers, molecular, polymeric and electrolytic hole-transporter materials. In order to further improve the efficiency of solid-state hybrid solar cells, attention has been recently focused on using polymers such as poly(3-hexylthiophene) (P3HT), to replace the more commonly used spiro-MeOTAD, in order to enhance the absorption within thick films. [3394]

Control of amplified emission and photodetection in a polyfluorene/diarylethene blend S. Perissinotto, A. Gaburro, A. Ram, S.K.S.M., C. Bertarelli, M. Carveli, K.S. Wong, G. Lanzani, Center for Nano Science and Technology - IIT@Polimi (IT); Politecnico di Milano, Department of Physics (IT); Politecnico di Milano, Department of Chemistry, Materials and Chemical Engineering (IT); Philips Research Labs (NL); Hong Kong University of Science and Technology, Department of Physics (HK). A novel system for amplified emission modulation based on a polyfluorene/diarylethene blend is shown. High sensitivity of Amplified Spontaneous Emission (ASE) is exploited to achieve strong emission modulation with a low intensity control signal. Moreover, the same system acts as photodetector switch based on the same principle. [3331]

Electron dynamics in thiolene based materials probed by two-photon photoemission E. Varenne, J. Martin, C. Bronner, M. Wolff, P. Tegeder, Freie Universität Berlin, Fachbereich Physik (DE). Semiconducting materials based on organic molecules or polymers are promising candidates for applications in electronic devices such as organic photovoltaic cells. It will be shown that time-resolved two-photon photoemission (TR-TPPE) is a valuable method to probe their electronic structure and carrier dynamics. [3500]

Nonlinear optical imaging of collagen liquid crystals A. Denat-Rousseau, P. De Sa Peixoto, G. Massé, M.-C. Schanne-Klein, Ecole Polytechnique, Laboratoire for Optics and Biosciences, CNRS, INSERM U696 (FR). Université Paris 6, Laboratoire de Chimie de la Matière Condensée, CNRS (FR). We use nonlinear optical microscopy to characterize collagen liquid crystalline phases at the micrometer scale. Second Harmonic signals provide highly contrasted images of the collagen cholesteric organization due to the large hyperpolarizability of collagen triple helices. Application of this methodology proved relevant to characterize solid-state hybrid solar cells. [3316]

Two-photon microscopy: a new approach to measure oxygen and blood flow in the brain Y. Gouloum Houseni, A. Parpaleix, J. Lecqi, M. Ducros, S. Vignaudo, Y. Charpil, Laboratory of Neurophysiology and New Microscopies, INSERM U603, CNRS UMR 8154, University Paris Descartes (FR); James H. Clark Center for Biomedical Engineering and Sciences, Stanford University (US); Department of Biochemistry and Biophysics, University of Pennsylvania (US). We present here a new technique based on two-photon microscopy and phosphorescence quenching of the oxygen sensor PIP-C343 to measure oxygen partial pressure in deep vessels of the rodent brain. [3551]

Ultrafast conformational dynamics studied by time-resolved circular dichroism F. Hocquet, Laboratoire d’Optique et Biosciences, Ecole Polytechnique - CNRS – INSERM (FR). Time-resolved circular dichroism experiments have been carried out in a pump-probe experiment. Two techniques are proposed. The first one relies on the modulation of the probe polarization whereas the second one uses a Babinet-Soleil compensator. Utilisation of this technique is shown in Binaphthol and in Carboxy-myoglobin. [3326]

Improved photovoltaic performances of heterostructured tetrapod-shaped CsSe/CdTe nanocrystals using C60 G. Gin, National Nanotechnology Laboratory, Institute of Nanoscience CNR, Innovation Engineering Department, University of Salento; Italian Institute of Technology, IIT@Unile (IT). Semiconductor nanocrystals (NCs) are promising building blocks for future-generation photovoltaic (PV) devices, such as all-inorganic NCs solar cells hybrid nanocrystal-polymer composite solar cells, and dye-sensitized solar cells. Colloidal inorganic NCs could offer processing, scale, and cost advantages of organics, while retaining the broadband absorption and superior transport properties of traditional PV semiconductors. Recently, considerable research has focused on the synthesis, shape control, and photophysics of heterostructured type II nanocrystals. Joining together in a single nanocrystal two materials with a type II band gap offset can, in fact, induce spatial separation of photogenerated carriers within the nanocrystal itself, with the electron residing in one material and the hole in the other one. [3283]

Two-photon microscopy of related materials Session chair: H. Michnèl Université de Vigo (ES)

Notes

Thursday, 28 October

Room: Huygens
TOM 5
16:00 - 17:00
Organic photovoltaics and spectroscopy of related materials Session chair: D. Lidzey University of Sheffield (UK)

16:00
Nonlinear optical imaging of collagen liquid crystals
A. Denat-Rousseau, P. De Sa Peixoto, G. Massé, M.-C. Schanne-Klein; Ecole Polytechnique, Laboratoire for Optics and Biosciences, CNRS, INSERM U696 (FR). Université Paris 6, Laboratoire de Chimie de la Matière Condensée, CNRS (FR). We use nonlinear optical microscopy to characterize collagen liquid crystalline phases at the micrometer scale. Second Harmonic signals provide highly contrasted images of the collagen cholesteric organization due to the large hyperpolarizability of collagen triple helices. Application of this methodology proved relevant to characterize solid-state hybrid solar cells. [3316]

16:30
Ultrafast conformational dynamics studied by time-resolved circular dichroism
F. Hocquet, Laboratoire d’Optique et Biosciences, Ecole Polytechnique - CNRS – INSERM (FR). Time-resolved circular dichroism experiments have been carried out in a pump-probe experiment. Two techniques are proposed. The first one relies on the modulation of the probe polarization whereas the second one uses a Babinet-Soleil compensator. Utilisation of this technique is shown in Binaphthol and in Carboxy-myoglobin. [3326]

Amphithéâtre Fresnel
TOM 6
16:00 - 17:00
Biological applications and imaging Session chair: F. Hache CNRS/Ecole Polytechnique LOB (FR)

16:00
Two-photon microscopy: a new approach to measure oxygen and blood flow in the brain
Y. Gouloum Houseni, A. Parpaleix, J. Lecqi, M. Ducros, S. Vignaudo, Y. Charpil; Laboratory of Neurophysiology and New Microscopies, INSERM U603, CNRS UMR 8154, University Paris Descartes (FR); James H. Clark Center for Biomedical Engineering and Sciences, Stanford University (US); Department of Biochemistry and Biophysics, University of Pennsylvania (US). We present here a new technique based on two-photon microscopy and phosphorescence quenching of the oxygen sensor PIP-C343 to measure oxygen partial pressure in deep vessels of the rodent brain. [3551]

Room: Maiman
TOM 7
16:00 - 17:00
New advanced photovoltaic devices Session chair: H. Michnèl Université de Vigo (ES)

16:00
Improved photovoltaic performances of heterostructured tetrapod-shaped CsSe/CdTe nanocrystals using C60
G. Gin; National Nanotechnology Laboratory, Institute of Nanoscience CNR, Innovation Engineering Department, University of Salento; Italian Institute of Technology, IIT@Unile (IT). Semiconductor nanocrystals (NCs) are promising building blocks for future-generation photovoltaic (PV) devices, such as all-inorganic NCs solar cells hybrid nanocrystal-polymer composite solar cells, and dye-sensitized solar cells. Colloidal inorganic NCs could offer processing, scale, and cost advantages of organics, while retaining the broadband absorption and superior transport properties of traditional PV semiconductors. Recently, considerable research has focused on the synthesis, shape control, and photophysics of heterostructured type II nanocrystals. Joining together in a single nanocrystal two materials with a type II band gap offset can, in fact, induce spatial separation of photogenerated carriers within the nanocrystal itself, with the electron residing in one material and the hole in the other one. [3283]
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<th>Room: Lippmann</th>
<th>Room: Michelson</th>
<th>Room: Foucault</th>
<th>Room: Newton</th>
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<tr>
<td>16:45</td>
<td>Image Improvement by a new Light Sheet Generating System in Ultramicroscopy</td>
<td>16:45</td>
<td>Student presentation</td>
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<tr>
<td>S. Saghafi1, K. Becker1, N. Jähring1, H.-U. Dodt1; 1Vienna University of Technology, FKE, Dept. of Bioelectronics (AT); 2Center for Brain Research, Medical University of Vienna (AT), 3Dept. of Neurobiology, University of Oldenburg (DE). We developed improved light sheet generation optics, which provide longer Raleigh ranges, whilst retaining beam waists comparable to the standard system with one cylindrical lens and a slit aperture. Using the modified system we achieved a marked improvement in the resolution of ultramicroscopy reconstructions of representative biological specimens. [3633]</td>
<td>Application of cavity-enhanced direct frequency comb spectroscopy in the detection of biomarkers in exhaled breath</td>
<td>A. Reyes-Reyes1, M.G. Zeitouny1, N. Bhattacharyya1, S.T. Paraj1, H.P. Urbach1, 2Dept. University of Technology, Optics Research Group (NL), 3VSL (NL). We discuss the cavity-enhanced direct frequency comb spectrometer developed in our laboratory. In particular we show how low concentrations present in the same gas sample can be simultaneously detected. Its capabilities make it a reliable tool in the analysis of human breath. [3508]</td>
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<td>16:45</td>
<td>Higher order conformation of poly(3-hydroxyalkanoate) studied by terahertz spectroscopy</td>
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<td>H. Hoshiba1, Y. Morisawa1, M. Sato1, I. Noda1, Y. Ozaki1, C. Otani1; 1RIKEN Advanced Science Institute (JP); 2Kansai Gakuin University (JP); 3The Procter &amp; Gamble Company (US). Terahertz absorption spectra of Poly (3-hydroxybutyrate) were measured. The orientation of the transition dipole moment was investigated by the polarization spectra. The temperature dependence of the spectra reflects the change in the hydrogen bonding distance of the crystalline structure. [3399]</td>
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<td>16:45</td>
<td>Realization of three-arm hybrid coupler with long range surface plasmon polariton and dielectric waveguides</td>
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<td>F. Liu, Y. Li, Z. Li, Y. Huang, Tsinghua University, Department of Electronic Engineering (CN). The three-arm hybrid coupler, which comprised of the middle long range surface plasmon polariton waveguide (Au strip) and two outside dielectric waveguides (SiNx strip), was fabricated and the high efficient coupling has been observed. [3353]</td>
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<td>17:00 - 17:30 coffee break (Bar terrasse)</td>
<td>17:30 - 19:00</td>
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<tr>
<td>Advanced and optimised photonics technology Session chair: M. Ferrari CNR-IFN, Istituto di Fotonica e Nanotecnologie (IT)</td>
<td>Terahertz spectroscopy techniques and tools Session chair: G. Gallot Ecole Polytechnique (FR)</td>
<td>Nanoparticles Session chair: S. Saghafi Università di Roma &quot;La Sapienza&quot; (IT)</td>
<td>Active Micro-optics &amp; lasers Session chair: B. Mayer University of Warsaw (PL)</td>
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<tr>
<td>17:30</td>
<td>Wide field supercritical angle fluorescence microscopy</td>
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<td>T. Barocca1, K. Roberto1, J. Delahaye1, S. Levêque-Fort1, E. Fort1; 1Institut Langevin, ESPCI ParisTech, CNRS UMR 7587, Université Pierre et Marie Curie, University Paris Diderot (FR), 2Centre de Photonique biomédical et Institut des Sciences Moléculaires d’Orsay, FRE CNRS 3363 (FR). We will present a new technique to observe cell adhesion phenomena and processes at membranes in living cells. This technique called supercritical angle fluorescence microscopy is based on fluorescence spatial filtering. It allows parallel wide field observation of in-depth cell imaging and membrane processes. [3556]</td>
<td>Multi-Tlz transients with electric fields exceeding 10 MV/cm in the single-cycle limit</td>
<td>17:30 Magneto-optical Interaction of light with thermal magons localised on metal ferromagnetic nanorods</td>
<td>Micro-optical sources for quantum communication in space</td>
</tr>
<tr>
<td>F. Junginger1, A. Self1, O. Schubert1, B. Mayer1, D. Brida1, M. Morangoni1, G. Carullo1, R. Huber1, A. Leitstorfer1; 1University of Konstanz, Department of Physics and Center for Applied Photonics (DE), 2Politecnico di Milano, ULTRAS-IFNIM-CNR, Dipartimento di Fisica (IT). Broadband parametric amplification of 1.3-μm pulses in GaSe crystals provides intense single-cycle idler transients covering the window between 1 and 60 THz with peak electric field amplitudes exceeding 10 MV/cm. The temporal trace of the phase-stable waveform is detected electro-optically. [3652]</td>
<td>J. Delahaye1, A. Sell1, O. Schubert1, B. Mayer1, D. Brida1, M. Morangoni1, G. Carullo1, R. Huber1, A. Leitstorfer1; 1University of Konstanz, Department of Physics and Center for Applied Photonics (DE), 2Politecnico di Milano, ULTRAS-IFNIM-CNR, Dipartimento di Fisica (IT). Broadband parametric amplification of 1.3-μm pulses in GaSe crystals provides intense single-cycle idler transients covering the window between 1 and 60 THz with peak electric field amplitudes exceeding 10 MV/cm. The temporal trace of the phase-stable waveform is detected electro-optically. [3652]</td>
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<td>M. Jofre1, A. Gardelean1, G. Anzolin1, M.W. Mitchell1, V. Pruneri1, 1ICFO-Institut de Ciencies Fotòniques (ES), 2ICREA-Instituto Catalán de Recerca i Estudis Avançats (ES). We report on the development of novel high speed and brightness integrated photonic sources for quantum key distribution in very demanding environmental conditions, such as those encountered in. [3358]</td>
</tr>
<tr>
<td>17:45</td>
<td>Optimization of the electric field strength of Tlz sources based on optical rectification</td>
<td>Amplitude and phase fields of photonic nanocubes</td>
<td>Student presentation</td>
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<tr>
<td>J.A. Fülöp1, L. Fálfal1, G. Almási1, J. Hebling1; University of Pécs, Department of Experimental Physics (HU). It is shown by calculations that the electric field strength of THz sources based on optical rectification of femtosecond pulses in UNbO3 can be increased by up to an order of magnitude by optimizing the pump pulse duration and cooling the crystal. [3553]</td>
<td>M.-S. Kim1, T. Schaf1, H.P. Herzig1, S. Mühlig1, C. Rockstuhl1, 1Ecole Polytechnique Fédérale de Lausanne (EPFL), Optics &amp; Photonics Technology Laboratory (CH), 2Friedrich-Schiller-Universität Jena, Institute of Condensed Matter Theory and Solid State Optics (DE). We report on advanced 3D direct imaging of light fields emerging from a photonic nanojet. We used an interference microscope that allows observation of amplitude and phase at the highest resolution. For the first time cross-polarization interferometry is used to characterize scattering properties of a nanojet sphere. [3318]</td>
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<td>17:45</td>
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Thursday, 28 October

**Room: Huygens**

16:45

**Experimental and numerical analysis of image wavelength conversion with a hydrogen Raman shifter**

G.G. Manahan\(^1\), M.L.Y. Torres-Mapa\(^1,2\), W.O. Garcia\(^1\); \(^1\)Univ. of the Philippines, National Institute of Physics (PH), \(^2\)University of St. Andrews (UK).

We investigate the transfer of two dimensional image carried by the 2nd harmonics (532 nm) of the Nd:YAG laser to the first Stokes (683 nm) wavelength using a hydrogen Raman shifter. [3538]

**Dimpled planar lightguide solar concentrators**

B.L. Unger\(^2\), G.R. Schmidt\(^2\), D.T. Mooore\(^1,2\); \(^1\)ICO Elected Vice-President, Chair of the ICO Committee for Regional Development (US); \(^2\)University of Rochester (US).

Lightguide concentrators show tremendous promise for thin form-factor, lightweight, and inexpensive replacements for the current generation of refractive and reflective solar concentrators. We propose a new type of structure for reducing optical losses and dramatically increasing the practical upper limit concentration within micro-structured lightguide concentrators. [3589]

**17:00 - 17:30 coffee break (Bar terrasse)**

**17:30 - 18:45 High-speed signal processing and ultra-fast phenomena**

**Session chair:** l. Siebbeles
Delft University of Technology (NL)

**17:30 - 18:45 Nonlinear lattices and waveguides**

**Session chair:** D. Skryabin
University of Bath (UK)

**17:30 - 19:45 ICO PRIZE AND GALILEO GALILEI AWARD CEREMONIES**

For the ICO PRIZE AND GALILEO GALILEI AWARD CEREMONIES please see page 7.

**Notes**

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1. Unlv. of the Philippines, National Institute of Physics (PH), University of St. Andrews (UK).
2. University of Rochester (US).
3. Lab. f. Organische Chemie, ETH Zürich (CH).
4. Department of Physics, Lehigh University (US).
5. Department of Electronics and Electrical Engineering, University of Glasgow (UK).
6. Department of Physics, University of Bath (UK).
7. Centre for Photonics and Photonic Materials, Department of Physics, University of Bath (UK).
8. Department of Physics, Lehigh University (US).
9. CEA, LETI, Minatec (FR).
11. GigOptix Inc. (CH) & GigOptix Bothell (WA) (US).
12. Cenetre for Photonics and Photonic Materials, Department of Physics, University of Bath (UK).
13. Department of Physics, Lehigh University (US).
14. Department of Physics, Lehigh University (US).
15. Centre for Photonics and Photonic Materials, Department of Physics, University of Bath (UK).

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A silicon-organic hybrid (SOH) platform combines CMOS technology with nonlinear organic cover materials. While strong light confinement is provided by silicon, its free-carrier limitations are avoided. We show 40 Gbit/s electro-optic modulation, all-optical 170 Gbit/s OTDM demultiplexing, and 56 Gbit/s DQPSK wavelength conversion. [3601]
We present compact trapping modules. We study the rotational dynamics of a birefringent nano-fabricated particle trapped in an optical torque wrench, and demonstrate both experimentally and theoretically the extolling effect of the system in a vicinity of a critical point. The excitable particle can be used as a non-linear local sensor for single perturbation events. [3695]

We present examples of compacting the optimization of the system. We determined the refractive index and absorption coefficient of micro-
thick films by standard terahertz time-domain spectroscopy thanks to the excitation of electromagnetic resonances (guides modes, surface plasmons) in periodic structures (metallic hole arrays, grating waveguide couplers) on which the films are deposited. [3668]

Poynting singularities, relationship between intensity distribution and other characteristics of vector field. We present examples of compact trapping modules. We study the rotational dynamics of a birefringent nano-fabricated particle trapped in an optical torque wrench, and demonstrate both experimentally and theoretically the extolling effect of the system in a vicinity of a critical point. The excitable particle can be used as a non-linear local sensor for single perturbation events. [3695]
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<th>Room: Huygens</th>
<th>Amphithéâtre Fresnel</th>
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<td><strong>TOM 5</strong></td>
<td><strong>TOM 6</strong></td>
<td><strong>TOM 7</strong></td>
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<td><strong>18:00</strong></td>
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<tr>
<td><strong>High-performance modulators for optical communications realized with a commercial side-chain DR1-PMAA electro-optic copolymer</strong></td>
<td><strong>Student presentation</strong></td>
<td><strong>ICO PRIZE AND GALILEI GALILEI AWARD CEREMONIES</strong></td>
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<tr>
<td>We report the high performance of electro-optic modulators made of a commercial side-chain electro-optic copolymer DR1-PMAA. The best figure of merit displays 3.84 V.cm at 1.55 μm wavelength which has never been observed in a modulator realized with a commercial electro-optic polymer. [3634]</td>
<td>M. Bogałowskii, P. Rose, C. Denz; Institut für Angewandte Physik und Center for Nonlinear Science (CoNeS), Westfälische Wilhelms-Universität Münster (DE).</td>
<td>Notes</td>
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<td>In this contribution, we present a novel approach in the field of optically induced photonic lattices. Based on an evolved variant of phase-engineered lattice waves, we are able to generate nondiffracting light distributions with miscellaneous advanced geometries. This allows for the optical induction of reconfigurable nonlinear Bessel, parabolic, Mathieu, and even quasi-periodic photonic structures. [3485]</td>
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<tr>
<td><strong>Student presentation</strong></td>
<td><strong>Mobile light bullets in modulated photonic lattices</strong></td>
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<td>Nanoscale imaging of photovoltaic blends using an ultrafast confocal microscope</td>
<td>I.L. Grigor’ev[1], M. Matuszewski[2,3], A.A. Sukhorukov[4,5], Center for Nonlinear Science (CUDOS), Research School of Physics and Engineering, Australian National University (AU), Instytut Fizyki PAN (PL).</td>
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<tr>
<td>G. Granati[1], D. Polli[1], J. Cabanillas[2,5], F. Artizzu[2], G. Carullo[1], G. Lanzani[1]; 1 Politecnico di Milano, Dipartimento di Fisica (IT); 2 IMDEA, UAM, Modulo C-IX (ES); 3 Center for Nano Science and Technology of IIT@POLIMI (IT). We introduce a novel instrument combining femtosecond pump-probe spectroscopy and confocal microscopy. We apply the system to map the spatial distribution of charge separation and recombination dynamics in photovoltaic blends made of Donor-Acceptor Bulk Heterojunctions. [3348]</td>
<td>We predict that stable mobile spatio-temporal solitons can exist in arrays of periodically curved optical waveguides. We find two- and three-dimensional light bullet solutions using variational formalism. Stability of the light bullets is confirmed by the direct numerical simulations which show that the bullets can freely move across the arrays. [3249]</td>
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<tr>
<td><strong>Ultrafast sensitization dynamics of Er(III) near-infrared emission in coordination compounds with organic ligands</strong></td>
<td><strong>Nonlinear Guidonics - functionalized waveguide arrays for all optical control of guided light on chip</strong></td>
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<tr>
<td>F. Quochi[1], F. Artizzu[2], M. Sabo[3], M. L. Mercure[1], P. Deplano[1], A. Mura[1], G. Bongiovanni[2]; 1 Politecnico di Milano, Dipartimento di Fisico, Università di Cagliari, SLACS-INFM/CNR (IT); 2 Dipartimento di Chimica Inorganica e Analitica, Università di Cagliari (IT). We investigate near-infrared sensitization dynamics of Er(III) complexes with organic ligands by means of transient photoluminescence and absorption spectroscopy. We demonstrate that sensitization time scales of 100 ps result in efficiencies of ~80%, thereby making it possible to reach erbium population inversion threshold. [3225]</td>
<td>N. Belabas Plougonven, C. Minot, A. Levenson, J.M. Toison; CNRS - LPN UPR 20 (FR). Following from optics or electronics, we design and model a first nonlinear light demonstrator : a double-barrier-like waveguide array perforning threshold-less gating of the incoming beam. [3510]</td>
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**End of TOM 5**
**Thursday, 28 October**

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<tr>
<th>Room: Lippmann</th>
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<th>Room: Newton</th>
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<tr>
<td><strong>TOM 1</strong></td>
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<td><strong>TOM 3</strong></td>
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<td><strong>Optimal 3D single-molecule localization for double-helix super-resolution microscopy</strong></td>
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<td><strong>Three dimensional tracking of gold colloids by digital holography</strong></td>
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<td><strong>Identification of the fundamental modes in whispering gallery microcavities by using coupler-induced resonance shifts</strong></td>
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<td>S. Quirin, S. Rama Prasanna Pavani, G. Grover, R. Piestun (Department of Electrical, Computer and Energy Engineering, University of Colorado (US))</td>
<td></td>
<td>F. Verpillat, F. Joud, M. Atlan, M. Gross, P. Desbiolles (Laboratoire Kastler Brossel, Ecole Normale Supérieure (FR), Institut Langevin, ESPCI (FR))</td>
<td></td>
<td>Y. Candélès, J.-B. Jager, G. Lin, V. Lefèvre-Seguin, J. Hare (Laboratoire Kastler Brossel, ENS, UPMC; CNRS (FR); CEA Grenoble INAC/SP2M/SINAPS Minatec (FR); Department of Physics, Xiamen University (CN))</td>
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<td>A Double-Helix PSF microscope for optimal single-molecule 3D localization is demonstrated. The post-processing algorithms attain optimal estimation by a combination of wave-optical processing and statistical analysis. The result is the most precise wide-field 3D localization on a per photon basis. [4020]</td>
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<td>We present in this abstract a digital holographic microscopy setup combining heterodyne detection and off-axis configuration to track gold nanoparticles in 3D. This technique can image the amplitude or phase of the whole light field in 3D avoiding any mechanical scanning. [3429]</td>
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<td>We demonstrate an alternative method to identify the radial order of Whispering Gallery Modes in optical microcavities. It is based on the shift and broadening induced by an evanescent coupler device. This method is first assessed for small spheres by comparison with Mie theory and then extended to on-chip microtoroids. [3567]</td>
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**End of TOM 1**

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**Notes**

- Student presentation

**Student presentation**

**Coupled micro cavities harnessing the outside-cavity modes for lasing, sensing, and wavefront detection**

S. Popov, N. Innocenti, L. Dong, S. Sergeyev (School of Information and Communication Technology, Royal Institute of Technology (SE), Optics research group, Waterford Institute of Technology (IE), Department of Applied Physics, Aalto University (FI), Department of Physics and Mathematics, University of Joensuu(FI))

Coupled micro cavities of hexagonal shape demonstrate interesting properties: high fill-factor for resonance modes inside the cavity and enhancement of the optical field outside the cavity. Resonance performances of such micro-optical devices are numerically investigated in this report. [3552]

**Student presentation**

**Controlling the directional emission of holey organic micro lasers**

I. Gashy, N. Djellali, D. Owens, S. Lozenko, M. Lebental, J. Lautru, C. Ulysse, B. Kippelen, J. Zyss (Ecole Normale Supérieure de Cachan, CNRS UMR 8537, Laboratoire de Photonique Quantique et Moléculaire (FR), Georgia Institute of Technology, Center for Organic Photonics and Electronics, School of Electrical and Computer Engineering (US), Laboratoire de Photonique et Nanosciences, CNRS LPP/20 (FR))

We report on measurements of the far-field pattern modification of stadium-shaped organic microlasers by introducing circular vacancies within the cavity. The optimal size and positions of these vacancies were obtained by Monte-Carlo style numerical ray simulations and a good agreement was obtained with experiments. [3338]
### Room: Michelson (TOM 2)

**9:00 - 10:45**

**THz solid-state spectroscopy**

Session chair: R. Huber

Universität Konstanz (DE)

#### Student presentation

**Ultrabroadband THz study of the femtosecond phonon and quasiparticle dynamics in superconducting YBa$_2$Cu$_3$O$_7$**

1Department of Physics and Center for Applied Photonics, University of Konstanz (DE);  
2Department of Physics, University of Fribourg (CH);  
3Department of Physics, Shanghai Jiao Tong University (CN);  
4Department of Physics, University, Tel Aviv University (IL);  
5Walter-Meißner-Institut (DE);  
6Complex Matter Department, Institute of Applied Physics, University of Fribourg, Switzerland (CH);  
7Complex Matter Department, Konstanz (DE).

We probe the THz conductivity of optimally doped bulk YBa$_2$Cu$_3$O$_7$ after 12-fs excitation and trace quasiparticles and specific lattice modes simultaneously. A novel line-shape analysis of the apex oxygen vibration allows us to monitor the ultrafast phonon occupation and find direct evidence for strong electron-lattice coupling. [3653]

#### Student presentation

**Ultrafast electron dynamics and transport in CdS nanocrystals studied by time-resolved THz spectroscopy**

1Academy of Sciences of the Czech Republic, Institute of Physics (CZ);  
2Charles University in Prague, Department of Chemical Physics and Optics (CZ).

Measurement and Monte-Carlo simulations of THz photocconductivity spectra in nanocrystalline films revealed a strong coupling between adjacent nanocrystals. Investigation of ultrafast dynamics shows that the coupling is stronger for electrons with high excess energy and it weakens as the electrons relax to the bottom of the conduction band. [3414]

### Room: Foucault (TOM 3)

**9:00 - 10:45**

**Plasmonics**

Session chair: A. Hartschuh

Ludwig-Maximilians-Universität (DE)

#### INVITED TALK

**Nonplasmonic enhancement of light-matter interaction**

S. V. Gasparovskiy, B. I. Stepanov; Institute of Physics, National Academy of Sciences of Belarus (BY). A general consideration of nonplasmonic enhancement of light-matter interaction is proposed in terms of incident field concentration and density of states concentration providing a rationale for huge enhancement factors allowing for single molecule detection by Raman spectroscopy. [3294]

### Room: Newton (TOM 4)

**9:00 - 10:45**

**Simulation and theory**

Session chair: N. Lindlein

University of Erlangen-Nürnberg (DE)

#### INVITED TALK

**Photonic metamaterials**

M. Wegener, Institut für Angewandte Physik, Institut für Nanotechnologie, and DFG-Center for Functional Nanostructures (CFN) Karlsruhe Institute of Technology (KIT), Germany (DE).

We review our recent experimental progress on three-dimensional photonic metamaterial structures made by direct-laser-writing technology. Examples are gold-helix metamaterials and three-dimensional invisibility cloaking structures. [3031]
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<tr>
<td>9:00 - 10:45</td>
<td>Parametric sources and effects</td>
<td>Optical design and processing for photovoltaic concentrators</td>
<td>9:00 - 10:40</td>
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<tr>
<td>Session chair: P.-F. Brevet</td>
<td>Session chair: A. Consortini</td>
<td>Workshop on Entrepreneurship and Business Innovation in PhD Education</td>
<td>Opening</td>
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<tr>
<td>Université Claude Bernard Lyon 1 (FR)</td>
<td>University of Florence, IT</td>
<td>Session chair: R. Baets</td>
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<td>Ecole C/O Ghent University - IMEC (BE)</td>
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<td><strong>Student presentation</strong></td>
<td><strong>INVITED TALK</strong></td>
<td><strong>INTRODUCTORY TALK</strong></td>
<td><strong>INVITED TALK</strong></td>
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<tr>
<td>A frequency-stabilized signal-resonant optical parametric oscillator for spectroscopic breath analysis</td>
<td>Ultrafast all-optical signal processing how and why</td>
<td>Introductory talk</td>
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<tr>
<td>We report on a widely tunable continuous-wave single-frequency signal-resonant optical parametric oscillator (SRO), delivering up to 1.8 W of idler power between 3 μm and 4 μm. This SRO will be used for multi-species trace gas sensing based on cavity ring-down spectroscopy.</td>
<td>Demand for fast and secure high capacity networks is growing. Currently offered solutions are hampered by the reappearance of electronic bottleneck. It is believed that to fully utilize transmission bandwidth of optical networks ultrafast all-optical signal processing may need to be implemented. Such approaches will be discussed.</td>
<td>The introduction will comment on the paradox that the issue of combining doctoral education and innovation would even be raised: how can that have happened?</td>
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<tr>
<td>9:15</td>
<td>6 W cw second-harmonic power at 532 nm in external cavity with periodically-poled MgO:LiTaO₃</td>
<td>9:00</td>
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<td>I. Ricciardi, M. De Rosa, A. Rocco, P. Ferraro, P. De Natale, I.NO-CNRIstituto Nazionale di Ottica, Sezione di Napoli, and LENS, European Laboratory for Nonlinear Spectroscopy (IT).</td>
<td>Time-dependent spectroscopy on NaF³⁺ and Er³⁺-doped fluorohalomurate glasses</td>
<td>Entrepreneurship for scientists and engineers</td>
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<tr>
<td>We report on cavity-enhanced cw second harmonic generation in a periodically poled LiTaO₃ crystal, achieving a maximum power of 6.1 W of green light at 532 nm with 8 W of fundamental power. Onset of competing nonlinearities can lead to a deterioration of the performance of the locked cavity.</td>
<td>U. Szkrypczak, M. Miclea, J.A. Johnson, B. Ahrens, G. Seifert, S. Schweizer; ¹ Centre for Innovation Competence SU-nano², Martin Luther University of Halle-Wittenberg (DE); ² Department of Materials Science and Engineering, University of Tennessee Space Institute (US); ³ Fraunhofer Center for Silicon Photovoltaics (DE); ⁴ Institute of Physics, Martin Luther University of Halle-Wittenberg (DE); The influence of BaO₃ nanocrystals on the radiative and non-radiative decay processes in rare-earth doped fluorohalomurate-based glasses is investigated using time-resolved optical spectroscopy.</td>
<td>G.F. Moore: Rudolf &amp; Hilda Kingslake Professor of Optical Engineering, Professor of Optics, Biomedical Engineering and Business Administration, Vice-Provost for entrepreneurship, University of Rochester (US).</td>
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<tr>
<td>9:30</td>
<td>Octave-spanning tunable frequency combs on a chip</td>
<td>9:30</td>
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<td>P. DeHaye, T. Herr, E. Gavartin, R. Holzwarth, T. J Kippenberg; ¹ Max Planck Institute für Quantenoptik (DE); ² Ecole Polytechnique Fédérale de Lausanne (EPFL) (CH).</td>
<td>Time-dependent spectroscopy on NaF³⁺ and Er³⁺-doped fluorohalomurate glasses</td>
<td>At the University of Rochester, we understand entrepreneurship to mean the transformation of an idea into an enterprise that creates value - economic, social, cultural, or intellectual. More than a discrete set of business skills or practices, entrepreneurship is a calling that can be pursued in many realms of experience and achievement. Entrepreneurship is a way of thinking, an approach to problems, an attribute of mind, and even a trait of character. It is a science and an art; entrepreneurship is a primary way in which a free society grows and improves not only its economy, but its cultural and social life as well. This talk will discuss a new M.S. degree in Technical Entrepreneurship and Management, which is specifically oriented to scientists and engineers.</td>
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<tr>
<td>We demonstrate direct full-octave spanning frequency comb generation via four-wave mixing in continuous wave laser pumped microresonators for the first time. The generated comb lines are fully tunable over more than one free spectral range.</td>
<td>U. Szkrypczak, M. Miclea, J.A. Johnson, B. Ahrens, G. Seifert, S. Schweizer; ¹ Centre for Innovation Competence SU-nano², Martin Luther University of Halle-Wittenberg (DE); The influence of BaO₃ nanocrystals on the radiative and non-radiative decay processes in rare-earth doped fluorohalomurate-based glasses is investigated using time-resolved optical spectroscopy.</td>
<td>At the University of Rochester, we understand entrepreneurship to mean the transformation of an idea into an enterprise that creates value - economic, social, cultural, or intellectual. More than a discrete set of business skills or practices, entrepreneurship is a calling that can be pursued in many realms of experience and achievement. Entrepreneurship is a way of thinking, an approach to problems, an attribute of mind, and even a trait of character. It is a science and an art; entrepreneurship is a primary way in which a free society grows and improves not only its economy, but its cultural and social life as well. This talk will discuss a new M.S. degree in Technical Entrepreneurship and Management, which is specifically oriented to scientists and engineers.</td>
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<tr>
<td><strong>TOM 6</strong></td>
<td><strong>TOM 7</strong></td>
<td><strong>WS</strong></td>
<td><strong>Friday, 29 October</strong></td>
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### EOSAM 2010 I www.myeos.org/events/eosam2010
### Notes

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<tr>
<th>Room: Michelson</th>
<th>Room: Foucault</th>
<th>Room: Newton</th>
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<tbody>
<tr>
<td><strong>9:45</strong> Terahertz dielectric and magnetic response near magnetic phase transition in a hexagonal multiferroic YMnO$_3$</td>
<td><strong>9:45</strong> Metallic optical nanostructures: a solution for planar integrated sensors on waveguides</td>
<td><strong>9:45</strong> Student presentation</td>
</tr>
<tr>
<td>C. Kodzieje, P. Kudiel, S. Kamba, M. Mostovoy, K.V. Plaxer</td>
<td>M. Roussey, Q. Tan, A. Cosentino, H.P. Herziger</td>
<td>Effective medium theory for calculating reflectance from metal- and-dielectric multilayered structure</td>
</tr>
<tr>
<td>1 Institute of Physics AS CR (CZ); 2 Zernik Institute for Advanced Materials, University of Groningen (NL); 3 Ioffe Physical Technical Institute, Russian Academy of Sciences (RI)</td>
<td>1,2,3 CREST, Japan Science and Technology Agency (JP); 1 Institute for Integrated Cell-Material Sciences, Kyoto University (JP)</td>
<td>S. Kameda, A. Mizutani, H. Kitkata; Osaka Prefecture University, School of Engineering (JP);</td>
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<tr>
<td>Time-domain terahertz spectroscopy is used to retrieve simultaneously dielectric and magnetic properties of hexagonal YMnO$_3$. A soft magnon in antiferromagnetic (AFM) phase and an additional broad excitation in the dielectric spectra at a similar frequency were observed. We interpret the latter as a consequence of a magneto-elastic coupling. [3389]</td>
<td>We report on the dynamics of electron-hole plasma near the Mott density by timedomain spectroscopy with visible pump pulse. Enhancement of the damping constant has been observed clearly. [3363]</td>
<td>Light reflectance from metal- and-dielectric multilayered structure (MDMS) was calculated by the effective medium theory (EMT). MDMS has a cylindrical dispersion surface. This property is applied to boundary conditions for deriving Fresnel’s equation. The calculated reflectance agreed well with results by numerical simulation. [3381]</td>
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<td><strong>10:00</strong> Enhancement of carrier scattering rate near the Mott density in photoexcited semiconductors</td>
<td><strong>10:00</strong> Control of luminescence through dielectric and magnetic properties of multiferroics</td>
<td><strong>10:00</strong> Field of view extension using satellite plasmonic nanostructures</td>
</tr>
<tr>
<td>S. Tan1,2, M. Nagai, K. Tanaka1,2,3</td>
<td>P.M. Adam, P. Vite, J. Plais, R. Jafar, P. Royer; Institut Charles Delaunay-Université de technologie de Troyes, CNRS FRE 2848, Laboratoire de Nanotechnologie et d’Instrumentation Optique (FR)</td>
<td>E. Logean, T. Scharf1, H.P. Herziger, M. Rossi2; EPFL IMT OPT (CH), 1Heptagon (CH)</td>
</tr>
<tr>
<td>1 Department of Physics, Graduate School of Science, Kyoto University (JP); 2 CREST, Japan Science and Technology Agency (JP); 3 Institute for Integrated Cell-Material Sciences, Kyoto University (JP)</td>
<td>Enhancement or quenching of molecules or quantum dots luminescence can be achieved with controlled plasmonic nanostructures. Isolated or coupled plasmonic nanoparticles can either exhibit large local fields or increase the quantum yield of fluorophores. [3432]</td>
<td>An approach to extend the field of view of a miniaturised imaging system is introduced. This innovative approach uses multiple optical systems working in parallel and image post-processing. As an example, a module consisting of a central single micro-lens camera and additional pinhole cameras was fabricated. [3303]</td>
</tr>
<tr>
<td>We report on the dynamics of electron-hole plasma near the Mott density by timedomain spectroscopy with visible pump pulse. Enhancement of the damping constant has been observed clearly. [3363]</td>
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<td><strong>10:15</strong> Electron mobility and dynamics in dye-sensitized ZnO and TiO$_2$ nanocrystals studied using time-resolved terahertz spectroscopy</td>
<td><strong>10:15</strong> Energy transfer between nanostructured silver surfaces and materials for organic photovoltaics</td>
<td><strong>10:15</strong> Imaging by a nonparaxial Light Sword Optical Element</td>
</tr>
<tr>
<td>H. Némec, J. Richtova, O. Tomались, E. Galoppini, P. Kučel, T. Polivka, A. Varrne, V. Sundström</td>
<td>R. Dunato, M. Handloser, P. Aitpeiter, A. Hartschuh, L. Schmidt-Mende, 1 Ludwig-Maximilians University, Hybrid Nanomaterials, Dept. of Physics (DE), 2 Ludwig-Maximilians University, Nano-optics, Dept. of Chemistry (DE)</td>
<td>Z. Jaroszewicz, K. Kokarekow, A. Kokol-Zajicka, M. Makowski, K. Petelczyk, M. Sypek; 1 Institute of Applied Optics and National Institute of Telecommunications (PL); 2 Warsaw University of Technology, Faculty of Physics (PL)</td>
</tr>
<tr>
<td>1 Department of Chemical Physics, Lund University (SE)</td>
<td>High resolution optical microscopy and photoluminescence measurements have been used to prove the energy transfer between localised surface plasmons and a semiconductor. As a model system, we have investigated an array of thin (50-150nm) silver ridges in a matrix of an organic semiconductor, poly[3-hexylthiophene]. [3463]</td>
<td>Preliminary simulation results based on a new approach allowing for modelling of incoherent and nonparaxial imaging show that the nonparaxially designed Light Sword Optical Element exhibits better lateral imaging resolution and a relatively more uniform quality across the whole range of the imaging space than any other elements with extended depth of focus of the same parameters known to date. [4010]</td>
</tr>
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</table>
10:00 **AIGaAs microcylinders for difference frequency generation in the Mid-IR**
We have designed and fabricated a CW source based on difference frequency generation (DFG) in an AIGaAs microcylinder, where two near-IR whispering gallery modes (WGMs) generate a mid-IR WGM. Its preliminary optical characterization discloses promising perspectives for this new archetype of integrated emitter. [3536]

10:00 **A novel broad-band back-side reflector for thin silicon solar cells**
J. Gjessing, A.S. Sudher, E.S. Marstein, Institute for Energy Technology (NO), 1University Graduate Center at Kjeller (NO), 2University of Oslo, Department of Physics (NO), University of Oslo, Faculty of Mathematics and Sciences (NO).
Efficient light trapping is necessary if Si-wafer thickness is to be reduced without compromising efficiency. In this work we propose a back-side 2D periodic structure with exceptional light trapping properties. We find through numerical simulations that the efficiency of our design exceeds that of ideal Lambertian light trapping. [4023]

10:15 **Student presentation**
**A pump-resonant signal-resonant optical parametric oscillator for radiometric applications**
We report on the characterization of a widely tunable continuous-wave pump-resonant signal-resonant optical parametric oscillator (PRSKO) delivering 10 to 50 mW over an octave mid-IR wavelength range (1.7-3.5 μm). Such a device will be used for radiometric applications. [3369]

10:15 **The organ of vision threshold characteristics application for energy effective light-optics systems iterative estimation by visibility level**
S.M. Gvozdev, O.K. Kusch, V.M. Shevchenko, IVNISI, Moscow, Moscow power engineering institute (RU), 1Novgorod state technical university (RU).
The algorithm of energy effective light-optics systems iterative calculation by visibility level is introduced in the article. This calculation is made on the base of multichannel model of organ of vision using threshold color spatial-frequency functions. [3666]

10:00 **Transparent conducting oxides in photovoltaics**
J.O. Carneiro, M.F.M. Costa, V. Teixeira, University of Minho, Physics Center (PT).
In this communication a brief description of the optics photonics and transparent conducting oxides (TCOs) materials research on photovoltaic (PV) devices will be presented. In addition, the Portuguese PV market will be discussed as well as the latest technologies in the PV market and its main applications. [3243]

10:00 **Embedded business development in academic photonics research**
D. Delbecq, Ghent University (BE).
Turning his/her research results into a commercial or societal product can be very stimulating and satisfactory for a PhD-student. Moreover, it might open the route to continue his/her research in another context when the PhD-trajectory is finished. Timing, involvement and guidance are key issues to enable this direct impact of the PhD research. However, the impact on his/her research activities must be minimal. Embedded business development might be the right approach.
An embedded business development manager can pro-actively identify technological opportunities. The embedded business development manager can stimulate, involve and engage the PhD-students and elaborate the business case without interfering with their research activities and can prepare them to step in the business case when the fundamental research oriented PhD trajectory is finished.
This technology transfer model is implemented at Ghent University, Plateau clusters laboratories and research groups of Ghent University to unite their expertise in the development of innovative photonic solutions, implemented by an embedded business developer. The modus operandi of Plateau will be discussed and concretized by example of “Caliopa”, a silicon photonics spin-off of Ghent University. [3909]
**Friday, 29 October**

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<th>Time</th>
<th>Room Michelson</th>
<th>Room Foucault</th>
<th>Room Newton</th>
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</table>
| 10:30 | **Student presentation**  
Broadband Terahertz pulse propagation in subwavelength size quantum cascade laser waveguides  
Vienna University of Technology, Photonics Institute (AT);  
Vienna University of Technology, Institute of Solid State Physics (AT);  
Vienna University of Technology, Center for Micro- and Nanostuctures (AT).  
Terahertz quantum cascade lasers are studied by Terahertz time-resolved spectroscopy. A coupling scheme for the coupling of broadband Terahertz pulses into the subwavelength cavity of a double metal quantum cascade laser is presented. The coupled pulses are then used for an investigation of optical properties of the gain material. [3523] |
| 10:30 | **Local and non-local effects in the second harmonic generation from gold nanoparticles evidenced by the interference between the selected dipolar and octupolar plasmons**  
Second Harmonic Generation from spherical gold nanoparticles is studied both theoretically and experimentally. Using a new interference effect between the dipolar and octupolar plasmons, observed in a specific configuration, we show how the local and non-local response arising from the surface and bulk sources can be quantitatively evaluated. [3498] |
|       | 10:45 - 11:15 coffee break (Bar terrasse) | 10:30 | Calculation of ray's propagation in gradient optical glasses  
A.I. Milanich;  
Institute of General Physic Russian Academy of Science (RU), Moscow Institute of Physic and Technology (MIPT) (RU).  
This article discloses a new method for calculation of ray propagation in gradient glasses. It simplifies calculations and even reduces some cases to analytical forms. [3025] |

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Notes

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10:45 - 11:15 coffee break (Bar terrasse)
### Friday, 29 October

**Room: Malmaison**  
**TOM 7**  
10:30  
**Optical bistability phenomenon in the systems of energy controlling**  
C.Yu. Zenkova; Optics and Spectroscopy Department, Chernivtsi National University (UA).  
The influence of outside factors, such as temperature, polarization of the probing laser beam, the size of the magnetic field, on the formation of the multilevel measuring and controlling energy system has been analyzed. The use of the optical bistability (OB) phenomenon, as an alternative mechanism for creating such systems, has been proposed. [3187]

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**Room: Lippmann**  
**WS**  
10:20  
**Project management and entrepreneurship in photonics at the graduate level**  
O. Fry¹, M. Catoire¹, L. Sarger²; ¹Bordeaux Unitec technopole, ²University of Bordeaux 1 (FR).  
For more than 6 years, training in entrepreneurship has been implemented at the Master level for physics degree at the Bordeaux 1 university. Close collaboration between technical advisors and experts in business development has enabled a specific program where graduate students explore the various paths to market of university’s proprietary research outcomes. This module has proven it’s potential to efficiently prepare business models and business plans. It has been applied to the MILMI (ATLANTIS) Photonics graduate school of Bordeaux during a specific weeklong summer school. Almost 20 graduate students from Europe and US, already in charge of (or involved in) a mature project have been trained to analyze the effective potential for a business creation. Methods and results will be exposed and discussed.

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<td>10:45 - 11:15 coffee break (Bar terrasse)</td>
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**Amphithéâtre Fresnel**  
**TOM 6**  
10:30  
**HYPE growth and characterization of GaP on different substrates and patterned templates for frequency conversion devices**  
V. Tassev¹, D. Bliss¹, C. Lynch¹, M. Snure¹, G. Bryant¹, R. Peterson¹, R. Bedford⁴, C. Yapp¹, W. Goodhue¹, K. Termkoro¹; ¹Air Force Research Laboratory, Sensors Directorate (US), ²Air Force Research Laboratory, Sensors Directorate (US), ³Solid State Scientific Corporation (US), ⁴University of Massachusetts, Photonics Center (US).  
Hydride vapor phase epitaxy was used to grow GaP on orientation patterned templates for quasi phase matched frequency conversion devices. To meet requirements for efficient device operation a process to produce high quality GaP at fast growth rates was developed. The successful replication of template patterns was demonstrated. [3287]
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<tr>
<td>12:00 - 12:45</td>
<td>PLENARY TALK</td>
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<td>Terahertz dynamics of condensed matter: from the quantum limit to ultrahigh fields</td>
<td>A. Leitenstorfer, University of Konstanz, Department of Physics and Center for Applied Photonics (DE). Recent studies on ultrafast dynamics of solids and nanostructures using few-cycle multi-terahertz pulses are presented. Phase-locked excitation transients with peak amplitudes beyond 1 V/Å are combined with uncertainty-limited electro-optic detection, resulting in an advanced access to the quantum properties of both condensed matter and light fields. [3615]</td>
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<td>Room: Amphithéâtre Fresnel</td>
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<td>12:45 - 13:45 lunch break</td>
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<tr>
<td>13:45 - 15:00</td>
<td>INVITED TALK</td>
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<td>Terahertz systems and facilities</td>
<td>R. Holzwarth, Max-Planck-Institute for Quantum Optics (DE)</td>
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<tr>
<td>13:45 - 16:15</td>
<td>INVITED TALK</td>
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<td>High-resolution imaging</td>
<td>S. Gaponenko, National Academy of Sciences of Belarus (BY)</td>
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<tr>
<td>13:45 - 16:00</td>
<td>INVITED TALK</td>
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<tr>
<td>Gradient index and guided optics</td>
<td>C. Gómez-Reino Carnota, Universidad de Santiago de Compostela (ES)</td>
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13:45

Thz systems based on 1.55 μm Telecom technologies
B. Sartorius, R. Dietz, H. Künzel, H. Roehle, D. Stanzel, M. Schell, Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut (DE)
This paper summarizes key developments for exploiting 1.5 μm telecom technologies for terahertz applications. Photocative antennas and photodiode based photonics are fabricated and used to assemble fibre coupled terahertz systems. Operation up to 4 THz (pulsed) and 2 THz (CW) is demonstrated. [3309]

13:45

High-resolution optical microscopy of nanotubes and nanowires
C. Georgi, M. Böhmler, N. Hartmann, A. Hartschuh, Department Chemie & CoNS, LMU (DE).
We used tip-enhanced near-field optical microscopy to probe the local spectroscopic properties along single nanotubes and nanowires with sub 20 nm spatial resolution. Coupling to the field-enhancing metal tip is shown to increase both excitation and radiation rates of the nanostructures leading to an angular redirection of emission. [3527]

13:45

Laser beam shaping by active GRIN media
M.T. Flores-Arias, A.I. Gomez-Varela, C. Gomez-Reino; “Microoptica y Optica GRIN” Group, Applied Physics Department, Faculty of Physics, Universidade de Santiago (ES).
We present laser beam shaping by an active GRIN material regarded as homogenization and beam transforming system. Effects of gain or loss in GRIN materials are taken into account by using complex refractive index. Condition for conversion of an input laser beam into an output uniform beam is achieved. [3359]
### Friday, 29 October

**Room: Lippmann**

<table>
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<tr>
<th>Time</th>
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<tr>
<td>11:15 - 12:00</td>
<td><strong>Is this the beginning of a new age in green photonics?</strong></td>
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<td>M. Lebby, Translucent Inc. (US)</td>
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<td>We may not have seen it, we may not have felt the impact, but green</td>
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<td>photonics has been quietly growing in our lives over the past decade.</td>
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<td>Engineers and scientists have always designed for efficiency in mind</td>
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<td>when they researched or built products. It is only in the recent</td>
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<td>few years, that our community has realized the bigger picture, and</td>
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<td>global impact of green photonics. Engineers and scientists will still</td>
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<td>strive for energy efficiency, cleaner solutions and improved health</td>
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<td>in their designs, except now, along with a larger percentage of the</td>
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<td>population, they focus more of their design in areas that impact</td>
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<td>beyond the actual product design itself. It is now a case of</td>
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<td>designing photonics for a greener world. Over the past half decade,</td>
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<td>the topic has become topical, political, and to some extent even</td>
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<td>cultural.</td>
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<tr>
<td>13:45 - 15:15</td>
<td><strong>Coherent effects, quantum effects, and chaos</strong></td>
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<td>Session chair: A.T. Friberg, Aalto University (FI)</td>
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<tr>
<td>13:45 - 16:30</td>
<td><strong>Novel technologies for high performance solar concentrators</strong></td>
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<td>Session chair: J.-P. Huignard, Consultant in Photonics (FR)</td>
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<tr>
<td>13:45 - 16:15</td>
<td><strong>Workshop on entrepreneurship and business innovation in PhD education</strong></td>
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**Notes**

13:45 - 13:45 lunch break

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**Amphithéâtre Fresnel**

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<td>13:45 - 15:15</td>
<td><strong>Semiconductor integrated source of quantum light at room temperature</strong></td>
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<td></td>
<td>A. Orieux, X. Caillet, A. Lemaître, P. Filloux, I. Favero, G. Leo, S. Ducci, Laboratoire Matériaux et Phénomènes Quantiques, UMR 7162, CNRS, Université Paris Diderot Paris 7 (FR), Laboratoire de Photonique et Nanostructures, CNRS-UPR20 (FR). We demonstrate an integrated source of counterpropagating twin photons at 1.55 μm emitting around $10^{11}$ pairs/pump photons. The indistinguishability of the photons of a pair is measured via a Hong-Ou-Mandel experiment showing a visibility of 85%. Several features of the device for quantum information applications are discussed. [3387]</td>
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<td><strong>Novel nonimaging designs of compact optics with the SMS method</strong></td>
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<td>J.C. Miñano, P. Benítez, J. Chaves, L. Jiayao, J. Infante, Universidad Politécnica de Madrid, Cedint (ES), UPR (US). New ultra-thin SMS optical designs are presented. They are formed by discontinuous sections working in parallel (multichannel) to provide the desired optical function. Each channel is defined by the smooth surfaces in between discontinuities. [3335]</td>
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<td>12:45 - 13:45</td>
<td><strong>From PhD to CEO</strong></td>
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<td>M. Mariton, President, AFOP and President and CEO, Horiba Jobin Yvon (FR). Based on personal experience from PhD years and first job at CNRS, French national research centre, to the position of CEO of a multinational technology company, the presentation will try to present a balanced view of the so-called &quot;gap&quot; in between research and industry, pointing to several possible bridges waiting to be explored. The innovation process will be discussed, showing key conditions of success and how human skills can prove decisive. The talk will conclude with some ideas for would-be CEOs today engaged on a PhD track, as well as indications on how academic curriculum and institutional processes could be enriched to encourage entrepreneurial projects. [3897]</td>
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**Room: Maiman**

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**12:45 - 13:45 lunch break**
14:15 Electric field detection of coherent synchrotron Terahertz radiation
I. Katayama1, H. Shimosato2, M. Bito3, K. Furusawa2, M. Adachi2, M. Shimada1, H. Zen1, S. Kimura1, N. Yamamoto1, M. Hosaka1, M. Kotoh1,3, M. Ashida3,4, Yokohama National University, IRC (JP), 2Chiba University, Graduate School of Engineering Science (JP), 3Institute of Molecular Science (IMS), UVSCOR (JP), 4SOKENDAI (JP), 5High Energy Accelerator Research Organization (JP), 6Nagoya University, Department of Engineering (JP), 7PRESTO, Japan Science and Technology Agency (JP).
We have demonstrated electric field detection of coherent synchrotron THz radiation in a storage ring. The measured electric field directly reflects the femtosecond modulation of electron density in bunches created with laser bunch slicing technique, and enables us to retrieve the profile of electron density distribution in the bunches. [3403]

14:30 New concepts for continuous wave and quasi time domain THz systems
C. Brenner, M.R. Hofmann; Ruhr-Universität Bochum, Photonik und Terahertztechnologie (DE).
We present a hybrid THz system which is capable to bridge the gap between pulsed THz generation and difference frequency generation. Furthermore we discuss new concepts for THz spectroscopy without a mechanical delay-line and the THz generation by optical downconversion without complex laser sources. [3571]

14:45 Strong modification of the fluorescence lifetime of a dipole emitter by multiple scattering in a disordered medium
R. Pierrot, R. Carminati; Institut Langevin, ESPCI ParisTech, CNRS UMR 7587 (FR).
We numerically study the fluorescence decay rate statistics of a dipole emitter embedded in a strongly scattering medium. In the multiple scattering regime, the probability of observing a decrease of the decay rate (increase of the lifetime) is substantial. Signatures of recurrent scattering are also visible in the behavior of the averaged decay rate. [3341]

14:30 Measuring and exploiting the transmission matrix in optics
S.M. Popoff, G. Lerosey, R. Carminati; Institut Langevin, ESPCI ParisTech, CNRS UMR 7587, ESPCI (FR).
We introduce a method to measure the transmission matrix of a complex medium. This matrix exhibits statistical properties in good agreement with random matrix theory and allows light focusing and imaging through the random medium. [3558]

14:30 Swift ion irradiation Lithium niobate waveguides with optical losses under 0.3 dB/cm
M. Jubera1, J. Villarroya1, M. Carrascosa1, A. García-Caballer1, M.L. Crespiollo1, A. Zebalos2, J. Olivares2, 1University Autónoma de Madrid, Dept. Física de Materiales (ES), 2CMAM, Universidad Autónoma de Madrid (ES), 3Optica, Consejo Superior de Investigaciones Científicas (ES).
We have investigated the propagation losses of Lithium niobate waveguides fabricated by swift ion irradiation (SHI). The influence of the temperature of the post-irradiation annealing has been studied. From the analysis propagation losses less than 0.5 dB/cm has been obtained for TE and TM modes. [3514]
### Amphithéâtre Fresnel

**14:00**  
System for second generation Quantum Key Distribution in the frequency domain  
J.-M. Merolla1, J. Case1, J. Mboj2, L. Ollag2, K. Phan Huy1, S. Massart2;  
1Institut FEMTO-ST UMR 6174, Département Optique (FR), 2Université Libre de Bruxelles, Département OPERA (BE), 3Université Libre de Bruxelles, Laboratoire d’information quantique (BE).  
We present a new architecture based on sidebands generation using standard electro-optic modulators and RF components to perform Quantum Key Distribution (QKD) using entangled photons. Stable non-classical interference in the frequency domain with visibility better than 98% has been realized using a fully automated system. [3340]

**14:15**  
Broad light harvesting in a solid-state dye-sensitized solar cell via Förster resonant energy transfer  
N. Humphrey-Baker1, K. Driess1, A. Zao1, H.J. Snaith1, R.H. Friend1;  
1Cavendish Laboratory, University of Cambridge, Department of Physics, Cambridge (UK), 2Clarendon Laboratory, University of Oxford, Department of Condensed Matter Physics (UK).  
Energy relay dyes have shown to broaden light harvesting in dye-sensitized solar cells (DSCs). We incorporate a light-absorbing, hole-transporting conjugated polymer (P3HT) into sensitized TiO2 with a zinc phthalocyanine dye (TT1) and show that there is highly efficient Förster resonant energy transfer from P3HT to the dye. [3503]

### Room Maiman

**14:30**  
Electro-optic phase dynamics for chaos communication field experiments at 100Gbps  
L. Larger, R. Lowry, M. Jacquot; FEMTO-ST, UMR CNRS 6174, Université de Franche-Comté, Optics Department (FR).  
An efficient and highly controllable chaotic oscillator has been designed. It involves electro-optic phase modulation, and non local nonlinear delayed feedback. State of the art optical chaos communication was demonstrated through two field experiments, at 100Gbps over more than 100km, involving optical amplifiers and dispersion compensation modules. [3342]

**14:35**  
PhD study in optical design and intellectual property  
The goal of our publication is to show attractiveness of optical design field for PhD students as it is the first step of developing any optical device and one of the most creative jobs in optical engineering. International Optical Design Seminar is given as example of motivation for PhD students to invent new solutions in optical design. [3629]

### Room Lippmann

**14:15**  
Case Study: Creating and Sustaining an Entrepreneurial Research Environment at the Applied Optics Group @ NUI Galway  
U. Murphy, Applied Optics Group, National University of Ireland, Galway (IE).  
The Applied Optics Group was formed in October 2002 in the National University of Ireland, Galway, with the support of Science Foundation Ireland. The group is part of the School of Physics in the Optics Cluster with the National Centre for Laser Applications and the recently established Biophotonics Group. The group currently has approximately 35 researchers, approximately 40% of whom are PhD students. The group is led by a Principal Investigator, and has an administrator/education outreach officer, and a Director of Industry and External Relations.  
Our research programme covers a wide variety of topics in applied optics and imaging science, including smart optics, adaptive optics, optical scattering and propagation, and engineering optics. In 2006, the Principal Investigator operation to the principle of “forgiveness rather than permission” created a new role of “Industry Outreach Officer”, and I, Una Murphy was recruited to this position.  
A case study will be presented on the development and maintenance of a continuously evolving industry portfolio, the nurturing of an entrepreneurial ethos, the creation of an environment to stimulate and support innovation, and the enabling of a capability to commercialise.  
The experience of a PhD student in this dynamic research environment will be explored. [3655]
**Notes**

**TOM 2**

14:45

**Room Michelson**

**TOM 2**

**Notes**

14:45

**Room Michelson**

**TOM 2**

**Notes**

**Student presentation**

**Beam reshaping based on the Light Wheel phenomenon**

R. Pollei$^{1,2}$, A. Moreau$^{1,2}$, M. Mihailovic$^{2,3}$, G. Graner$^{1,2}$, J.国民经济 Highly, Université Blaise Pascal (FR); 2CNRS, UMR 6602 (FR).

A lamellar structure designed to support a localized mode called Light Wheel is used to reshape a beam. An analytical model is proposed to describe this very thin beam expander and to characterize the profile of the transmitted beam. [3329]

**Student presentation**

**Surface enhanced raman scattering of gold nanostructures: Role of dipolar and multipolar localized surface plasmons**

N. Guillot$^1$, B. Frémaux$^1$, S. Ben Amor$^1$, H. Shen$^2$, O. Peron$^2$, T. Tourné$^2$, E. Rinnert$^3$, M. Lamy de la Chapelle$^3$, 1Université Paris XIII, Laboratoire CSPBAT (FRE 3043), UFR SMBH (FR); 2CNRS, UMR 6602 (FR).

Considering only the electromagnetic contribution of Surface Enhanced Raman Scattering (SERS), we investigate arrays of gold nanoparticles designed through electron beam lithography and lift off techniques. [3611]

**Student presentation**

**Modelling of active Nd-doped Silicon Oxide waveguides for optically pumped laser cavities**

Y.G. Boucher, J. Charrier, P. Pirasteh, Y. Dumeige; Université Européenne de Bretagne, FOTON UMR CNRS 6092 (FR).

In the frame of a simple model based on the rate equation formalism, we derive the main steady-state properties of optically pumped Nd-doped Silicon resonant structures embedded with Silicon nanoclusters. [3376]

**Student presentation**

**Microscopy with self-reconstructing beams**

F.O. Fahrbach$^{1,2}$, A. Rohrbach$^{1,2}$, 1University of Freiburg, Centre for Biological Signalling Studies (bioss) (DE); 2University of Freiburg, Laboratoire pour Bio- and Nano-Photonics (DE).

Interaction of holographically shaped self-reconstructing beams with scattering media is analyzed. An increase in information content of images of extended inhomogeneous media by reduction of artefacts arising from scattering and by increase of penetration depth was found and quantitatively analyzed. [3320]

**Student presentation**

**3D waveguides and grating couplers fabricated with gray-scale E-beam lithography**

L. Dong$^1$, C. Popov$^1$, A.T. Friberg$^{1,2,3}$, 1School of Information and Communication Technology, Royal Institute of Technology (SE), 2Department of Applied Physics, Aalto University (FI), 3Department of Physics and Math., University of Joensuu (FI).

Gray scale electron-beam lithography is applied to prototype 3D waveguides and grating output couplers in SU-8 simply and accurately. The lag effect in reactive ion etching of Silicon-on-insulator gratings is avoided here. Both positive- and negative-height relief features can be easily fabricated in one step process. [3508]

**Student presentation**

**Modelling of active Nd-doped Silicon Rich Silicon Oxide waveguides for optically pumped laser cavities**

Y.G. Boucher, J. Charrier, P. Pirasteh, Y. Dumeige; Université Européenne de Bretagne, FOTON UMR CNRS 6092 (FR).

In the frame of a simple model based on the rate equation formalism, we derive the main steady-state properties of optically pumped Nd-doped Silicon resonant structures embedded with Silicon nanoclusters. [3376]
14:45 The calculation of the number of degrees of freedom of an Image (NDFI). This constructive proof is based on the explicit calculation of the number of statistically independent image sampling points and solves therefore the optimal sampling problem. The NDFI for aberrated and partially coherent images are also calculated. [3627]

15:00 Purely spatial quantum correlations and entanglement of twin photons in type II spontaneous parametric down conversion. F. Devaux, J. Mougin–Sisini, E. Lantz; Institut Femto-ST, Département d’Optique P.M Duffieux CNRS-UMR n°6174, Université de Franche–Comté (FR).

We have measured sub-shot-noise quantum correlations of spatial fluctuations in the far-field image of the parametric fluorescence created in a type II β-barium-borate nonlinear crystal. Imaging is performed in photon counting regime with an electron-multiplying CCD camera. Purely spatial quantum entanglement is also investigated. [4013]


Fluids in which nanometer-sized particles are suspended have been recently proposed as direct absorbers in solar thermal collectors. The optical properties as absorption and scattering coefficients of carbon nanohorns based nano-fluids are investigated with the utilization of a simple and precise technique. [3161]

15:00 Technology drivers for an acceleration of PV development. J.P. Joly; INES (Institut National de l’Énergie Solaire) (FR). PV cost reduction will be driven by innovations. This presentation will focus on where those innovations should come from and what should be the contribution of the optical community. [3099]

15:30 Using Nd:LSB microchip laser pulses for location of jointed different fibres. J.A. Modupeh Hodasi, P.K. Bouch-Bassuy; Laser and Fibre Optics Centre (LAFOC), Physics Department, University of Cape Coast (GH).

We report on the preliminary study of the use of Nd:LSB microchip laser to measure the length of optical fibres. Pulses of 3.1ns at a wavelength of 1.062nm are backscattered from within the optical fibre and the time of arrival of the reflected signal is used to locate the point of mechanical splicing of a single-mode fibre to a multimode fibre, and therefore, we are able to calculate within the range of centimetres, the length of the single-mode fibre as 467.55m, and that of the multimode fibre to be 14.80m. [3908]

15:45 Optical testing bench for intraocular lens characterization. F. Alba-Bueno, F. Vega, M. S. Millán; Universidad Politécnica de Cataluña, Departamento de Optica y Optometría (ES).

The optical imaging quality and other important features of intraocular lenses can be tested in an optical bench specifically designed for this purpose. The setup meets the current ISO standard. It allows wavefront sensing, spectral characterization and the simulation of model eyes with diverse aberrations. [3903]

16:00 Rare earth doped glasses as down-converters to improve Si-based solar cell efficiency (please see page 75)
### Micro-optics applications in high-power laser systems

Th. Graf¹, A. Voss¹, B. Weichel¹, D. Blázquez-Sánchez¹, M.-M. Vogel¹, A. Austerschulte¹, M. Abdou Ahmed¹, A. Popp¹, A. Killi¹, S. Unger¹, J. Kirchlöff¹, M. Bartelt¹; Institut für Strahlwerkzeuge (IFSW), Universität Stuttgart (DE),² TRUMPF Laser GmbH & Co KG (DE),³ Institut für Photonische Technologien (IPHT) (DE).

We report on different applications of micro-optics for the generation and the transport of laser radiation with high beam quality in the kW power range. This includes aspherical mirrors to improve the beam quality of thin-disk lasers and guided wave optics for the transport and the brilliance conversion in optical fibers. [3286]

### Collimation of VCSEL beam using a nanostructured GRIN micro lens

J.M. Nowosielski¹,², R. Buczyński¹,², F. Hudelist¹, A.J. Waddie¹, M.R. Taghi-zadeh¹;¹ Heriot-Watt University, School of Engineering and Physical Sciences (UK),² University of Warsaw, Faculty of Physics (PL).

In this paper we show numerically that a nanostructured Gradient Index (nGRIN) micro lens can be utilized for collimation of a beam generated by a VCSEL, characterised by a half-width of 1.53µm. The refractive index gradient of the nanostructured GRIN micro lens is very high resulting in a lens thickness of 65.8µm. [3227]

### Controlling molecular organization towards the realization of nanoscale light sources

C. Fiorini-Debusschert, I. Berline, L. Douillard, F. Charra; CEA-IRAMIS, SPCSII, Nanophotonics Laboratory (FR).

Using the electric field present inside a Scanning Tunnelling Microscope (STM) junction, we demonstrate the possibility to create a very local non-centrosymmetry via molecular orientation under the tip. We show this can be used to get localized light emission through second harmonic generation (SHG). [3368]
Rare earth doped glasses as down-converters to improve Si-based solar cell efficiency

M. Ferrari\textsuperscript{1}, G. Alombert Goget\textsuperscript{1}, C. Armellini\textsuperscript{1}, A. Chiassera\textsuperscript{1}, S. Bemeschi\textsuperscript{1}, S. Pellii\textsuperscript{2}, G.C. Righini\textsuperscript{1}, M. Bregoli\textsuperscript{1}, A. Maglione\textsuperscript{1}, G. Pucker\textsuperscript{4}, G. Speranza\textsuperscript{4}; \textsuperscript{1}CNR-IFN, Istituto di Fotonica e Nanotecnologie, CSMFO Lab (IT), \textsuperscript{2}CNR-IFAC, Istituto di Fisica Applicata Nello Carrara, MDF Lab (IT), \textsuperscript{3}Optoelettronica Italia S.r.l. (IT), \textsuperscript{4}FBK (IT).

The solar cells efficiency may be improved by better exploitation of the solar spectrum, making use of the down-conversion mechanism. In this lecture, attention is focused on the assessment of the energy transfer efficiency between the Tb\textsuperscript{3+} and Yb\textsuperscript{3+} ions in sol-gel derived SiO\textsubscript{2}-HfO\textsubscript{2} glass ceramic planar waveguides. \cite{4002}
A new nanosensor for polycyclic aromatic hydrocarbons detection in marine environment

In this work we report an accurate synthesis of a SERS nanosensor based on nanoscale gold structures obtained by Electron Beam Lithography, suitable for environmental analysis.

3D translational and orientational optical control of multiple rod-shaped bacteria

We hereby present a simple method to calibrate simultaneously the trap stiffness of an optical trap and the coefficient calibration factor of the quadrant photodiode using an acousto-optic deflector.

Study of thermodamage to Neuroblastoma NG108 cells due to manipulation with optical tweezers

We demonstrate translational and orientational optical control of rod-shaped bacteria. Our approach utilizes holographic optical tweezers (HOT) and enables for the first time full rotational control of multiple bacteria with respect to any arbitrary axis.

Notes
**POSTER SESSION I:**

**Wednesday, 27 October, 13:45-15:15**

**exhibition hall**

**TOM2_3595_01**

**Student presentation**

T. Akolli, J. Tüür, G. Ducournau, J.-F. Lompin; IEMN, Lille1 University (FR).

In this work, we introduce an application at terahertz (THz) frequencies of planar Goubau lines (G-lines). We are focusing on THz near-field imaging systems up to 1 THz. These systems are designed to fill the lack of high-sensitive imaging components for the gap between microwave and optical band.

**TOM2_3645_02**

**Student presentation**


The experiments on the dc current influence on non-resonant terahertz plasma wave detection in InGaAs/InAlAs multi-channel High Electron Mobility Transistor (HEMT) are reported. We show that the observed transformation of detection regime takes place because the current reduce plasma waves damping increasing the quality factor of the HEMT channel cavity.

**TOM2_3440_03**

**Student presentation**

S. Popov, L. Dong, S. Sergeyev, A.T. Friberg; School of Information and Communication Technology, Royal Institute of Technology (SE), “Optics research group, Waterford Institute of Technology (IE),” Department of Applied Physics, Aalto University (FI), “Department of Physics and Mathematics, University of Joensuu (FI).”

Application of scanning near-field microscopy technique in the THz range demonstrates enhanced resolution of the scanned image. We develop a rigorous numerical model which can properly describe both these phenomena.

**TOM2_3490_07**

**Student presentation**

V. Skoromets, C. Kadlec, P. Kuzel, S. Kamba; Institute of Physics, Academy of Sciences of the Czech Republic (CZ), “Institute of Bio and Nanosystems, Research Center Jülich (DE).”

We investigate 100-nm-thick epitaxial monolayer of SrTiO$_3$ grown by pulsed laser deposition on (110)-oriented DyScO$_3$, using far infrared and THz time-domain spectroscopy. A tunability of high-frequency polar phonons in SrTiO$_3$ is demonstrated upon dc electric bias applied to an electrode structure deposited on the film surface.

**TOM2_3409_05**

**Student presentation**

D. Dietze, J. Dormo, M. Mari, K. Unterrainer; Vienna University of Technology, Photonics Institute (AT).

Planar metamaterials, so-called metasurfaces, can efficiently be described by a modified transfer matrix formalism that takes into account anisotropic, conductive interfaces. This method is applied for evaluation of the transmission of THz pulses through different metasurface geometries.

**TOM2_4015_09**

**Student presentation**

V. Vasilitsis, V. Smilgevicius, V. Jarutis; Vilnius university Laser Research Center (LT).

Phase relations between focused bichromatic laser pulses inducing terahertz radiation from gaseous media have been analysed. In addition to the phase terms obtained using plane-wave approximation, the yet unreported phase difference term, which in most cases can be as large as π/2, has been found.

**Notes**

**TOM2_4011_10**

**Student presentation**


We experimentally observe amplified stimulated emission of terahertz electromagnetic radiation at room temperature from exfoliated graphene on SiO$_2$/Si substrate by optical-pump/terahertz-probe spectroscopy with a femtosecond-pulsed laser operating in the optical communication band.

**Notes**
Poster session

TOM2_3306_121 Terahertz signatures for security and safety applications


Imaging Terahertz sensors for security and safety applications are rapidly developing. Radar characteristics for humans and small items have been collected using a 220 GHz radar in tower turntable configuration and applying ISAR imaging techniques.

TOM2_3285_12 A nematic mixture with high Terahertz anisotropy

N. Vieweg, M.K. Shafkat, M. Koch; Department of Physics, Philipps University Marburg (DE).

A nematic mixture with high Terahertz anisotropy is presented. We determine the Terahertz properties of the nematic mixture BL037 using terahertz time domain spectroscopy and find the highest THz birefringence of all measured nematic mixtures. The temperature dependence is studied.

TOM2_3259_13 Refractive Gaussian-to-Tophat 1-ray beam shaper

R. Kleinleder, L. Maillier, S. Sinzinger; Technische Universität Ilmenau, IMN MacroNano, Fachgebiet Technische Optik (DE), Bell Laboratories, Alcatel-Lucent (US).

We describe the design and fabrication of an efficient, refractive Gaussian-to-tophat beam shaper (GTBS) for 1-rays (THz waves). The produced intensity distributions are measured and compared with corresponding wave-optical simulations, which allows for the verification of the applied design rules and fabrication methods.

TOM2_3184_14 Development of Terahertz-diapason coherent radiation sources with pumping by TEA CO2-lasers

G.A. Baranov1, V.V. Khukharev1, P.V. Tomashevich2, Yu.I. Malakhov2; 1NIIEFA named after D.V. Efremov (RU), 2Institute of Physics of National Academy of Science of Belarus (BY), 3International Science and Technology Center (RU).

In the report there are presented results of research directed to creation of effective Terahertz sources of radiation with pumping by TEA CO2-laser. In particular, for generation of high-power Terahertz radiation we suggest to use TE CO2 laser with optical pumping.

TOM2_3636_15 Concept of multi-terawatt picosecond CO2 Laser for Investigation of the laser radiation interaction with a matter

G.A. Baranov1, V.V. Khukharev2, A.Y. Vasilev1, S.A. Kotov1, P.V. Tomashevich2, Yu.I. Malakhov2; 1NIIEFA named after D.V. Efremov (RU), 2International Science and Technology Center (RU).

In this report building and application questions of picosecond terawatt CO2 laser facilities are presented. The main attention is paid to the intermediate water capacitor integrated into the gas-discharge chamber. The main results of experimental investigations of characteristics of 10 TW CO2-laser components are briefly stated.

TOM2_3248_17 All-fiber Terahertz Imager based on 1.5 μm technology


We report on a compact all-fiber terahertz (THz) time-domain spectroscopy imager employing a single 1.5 μm erbium-doped fiber laser with dual output to illuminate InGaAs/InAlAs photodetective antennas through polarization maintaining optical fibers with alternated group velocity dispersions.

TOM2_3385_18 Frequency generation in the THz domain using a mode-locked Quantum-Dash Laser

A. Lagrost1,2, M. CatosciSilva1, M. Gay1, L. Bramerie1, P. Besnard1, A. Shen1, G.H. Dunn1, J. Sony Corporation Tokyo Medical and Dental Laboratory, Advanced Materials Laboratories, Sony Corporation Tokyo Medical and Dental University (JP).

We propose a simple method to generate an optical clock up to 1.4 THz using a Quantum Dash mode-locked laser. The jitter of the generated frequency is less than 15 fs. The quality at 170 GHz is assessed through BER measurements.

TOM2_3185_16 Development and creation of the International facility for study of CO2-laser radiation and matter Interaction (ISTC Project № 3961)

G.A. Baranov1, V.V. Khukharev2, P.V. Tomashevich2, Yu.I. Malakhov2; 1NIIEFA named after D.V. Efremov (RU), 2International Science and Technology Center (RU).

In the report there is presented a description of the ISTC Project №3961 (iDevelopment and creation of the International facility for study of CO2-laser radiation and matter interaction). The facility will be built on the base of solid-state or CO2 master oscillator and wide aperture high-pressure CO2-amplifier. Different schemes of the MO are described and compared. In a case of CO2 master oscillator picosecond Nd:YLF laser with pulse length of 6 ps and energy of 2 mJ at 0.527 μm wavelength provides control on elements of systems for forming picosecond CO2 impulse. As a result of the Project completion a picosecond facility with multiple-pass pre-amplifier will be created.

TOM2_3905_19 Spatial and spectral properties of small area THz generation for sub-wavelength microscopy

P. Buccheri1,2, M. Pecianti1,2, A. Busacca1, T. Ozaki1, R. Morandotti1,2, DIEET-DEPARTMENT of Electrical, Electronic and Telecommunications Engineering, University of Palermo (IT), 2Ultrafast Optical Processing, INRS-EMT (CA), 3Institute for Chemical and Physical Processes, CNR, “Sapienza” University (IT).

A highly localized terahertz (THz) source is a promising candidate for sub-wavelength microscopy, due to its superior radiation power throughout with respect to others near-field techniques. Here, we report on the spatial and the spectral near-field properties of our highly localized THz source.
TOM3_3566_01
Titre Metamaterials and Plasmonic Waveguides
T. Akahane1, W.-C. Chen2, T. Türel1, W. Padilla1, 1IMEH, Lille 1 University, (FR). 2Boston College, (US).
We will present the different topologies for THz filters with the use of planar Goubau lines. These waveguides highly confine the THz electromagnetic waves which propagate like a surface plasmon. Optimized excitations will be presented. For the filters, we will particularly study the approach with resonators along the Goubau line. Some structures will require cascading several resonators in order to reach a desired rejection level at given frequencies. We will present filters with a minimum number of resonators i.e. only one. Electro-magnetic simulation results show clearly two resonances with two different resonators at 0.25THz and 0.3THz. The substrates used have low permittivity. We will also discuss on plasmonic waveguides based on corrugated planar Goubau lines.

TOM3_3566_02
Optical properties of Au nanodisks oriented parallel to each other
K. Awasu1, X. Wang1, T. Komatsubara2, S. Ishihara2. 1Photonics Research Institute, National Institute of Advanced Science and Technology (JP), 2Tandem Accelerator Complex, University of Tsukuba (JP). The fabrication of a slot waveguide cavity oriented to sensing application is demonstrated. The choice of materials and the development of the process flow steps, including E-beam lithography (EBL) and metal lift-off of a single thin layer, are illustrated and discussed to obtain 30 nm width slots in a thin gold layer.

TOM3_3566_03
High resolution spectroscopy of an atomic vapour confined in an opal of glass nanospheres
I. Maurin1,2, P. Ballin1,2, Athanasios Laliotis1,2, D. Bloch1,2. 1Laboratoire de Physique des Lasers, Université Paris 13 (FR), 2Laboratoire de Physique des Lasers, CNRS (FR). In the spirit of our systematic investigation of resonant atomic vapour (Cs vapour) in micro and nano-cells (1D confinement), we investigate the behaviour of a vapour confined in the nanometric interstitial regions of an opal made of glass spheres (3D confinement). Sub-Doppler lines are observed in preliminary experiments.

TOM3_3493_05
Optimized sub-wavelength grating mirror design for mid-infrared wavelength range
C. Chevallier, F. Genty, N. Plessis, J. Jacquet, LMOP, EA 4423, Supélec/ Université Paul Verlaine (FR). We present the design of a sub-wavelength grating mirror optimized for integration in mid-IR VCSEL. The definition of a quality factor adapted to VCSEL requirements and maximized by an optimization algorithm allowed us to obtain a polarization selective and high reflectivity structure showing several percent of tolerance.

TOM3_3443_06
Fabrication of slot waveguide cavity for sensing application
A. Coentino, Q. Tan, M. Roussey, H.P. Herziger, Ecole Polytechnique Fédérale de Lausanne (EPFL), Institut de Microtechnique, Optics & Photonics Technology Laboratory (CH). The fabrication of a slot waveguide cavity oriented to sensing application is demonstrated. The choice of materials and the development of the process flow steps, including E-beam lithography (EBL) and metal lift-off of a single thin layer, are illustrated and discussed to obtain 30 nm width slots in a thin gold layer.

TOM3_3463_08
Quantum Well Solar Cells based on Semiconductor Superlattice
S. Faro1, P. Steiron2, L. Faro1, M. Lanoz1. 1IPA SA, RES Department (RO);2Politechnics University of Bucharest, Faculty of Applied Science (RO). This paper deals with modelling of semiconductor superlattice, as a key point in the development of new quantum well solar cells. It includes a comparative study of the transmission coefficients as determined by the shape of the hetero-structure interface for different possible applications.

TOM3_3478_04
Gradient echo all-optical multiplexor
F. Carreño, M.A. Antón, Escuela de Óptica, Universidad Complutense de Madrid (ES). We analyze the storage and retrieval of two trains of weak pulses in an ensemble of tripod-like atoms subject to a longitudinal varying magnetic field. An auxiliary and for detuned coupling field transfers the incoming pulse onto the channels of the system. The time reversion of the magnetic field releases the pulses from the medium.

TOM3_3545_09
A novel mechanically-optical modulator based on a metal nanowire array
D. Fedyanin, A. Arsenin, Moscow Institute of Physics and Technology, Laboratory of Nanooptics and Femtosecond Electronics, Department of General Physics (RU). We propose a novel mecanico-optical modulation technique. It is based on the nanowire array deposited above the thin metal film. Changing the distance between the nanowire array and the film, we can control the intensity of the surface plasmon polariton (SPP).

TOM3_3638_10
Optical properties of coupled and non coupled quantum structures embedded in thin films
Y.J. Chen1,2, C. Chen2,1, T. Komatsubara2, A. Laliotis1,2, L. Escoubas3, C. David3, O. Frénel4, H. Derbal5, H. Le Louco5, J. Le Rouzo5, E. Rinnert6, T. Toury6,3, H. Shen2, S. Ben Amor1, C. Gohn1,2, W. Padilla1,2. 1Laboratoire de Physique des Lasers, CNRS (FR); 2Laboratoire de Physique des Lasers, Université Paris 13 (FR); 3Thin Film Technology Center, General Physics (RU); 4Laboratoire de Nanotechnologie et d’Instrumentation Optique, Institut Charles Delaunay, Département Recherches et Développements Technologiques (FR). This study describes the effect of the surrounding medium on the SERS efficiency using nanolithography substrates designed through electron beam lithography and lift off techniques.
### Poster Session I

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<tr>
<th>Session</th>
<th>Title</th>
<th>Abstract</th>
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<td>TOM3_3630_13</td>
<td>Localized Surface Plasmons on gold nanostructures: Scattering evolution with the nanostructures size</td>
<td>N. Guillot², S. Ben Amor¹, H. Sheri⁴, T. Touy², M. Lamy de la Chapelle⁴, Université Paris XIII, Laboratoire CSPBAT (FR), Université de Troyes, Laboratoire de Nanotechnologie et d’Instrumentation Optique, Institut Charles Delourey (FR). This study describes the scattering behaviour of gold nanoparticles designed through electron beam lithography and lift off techniques with variable diameters. We compare the scattering contribution to the extinction spectrum experimentally and theoretically.</td>
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<tr>
<td>TOM3_3569_14</td>
<td>Controlled Embedding of Nanoparticles in Light Emitting Diodes</td>
<td>O.T.A. Jansen, H.P. Urbach, Delft University of Technology (NL). We present a theoretical study on nanoparticles embedded in light emitting diodes (LEDs) to enhance light extraction. The particle size and position are optimized with a method based on the reciprocity theorem. 2D and 3D LED designs with and without photonic crystal structures are investigated.</td>
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<tr>
<td>TOM3_4018_15</td>
<td>Laser - driven precipitation and modification of silver nanoparticles in soda-lime glass</td>
<td>M. Grabiec², A. Wolak², O. Verano², J.P. Bloudeau², N. Pfeiffer¹, S. Pfeiffer¹, K. Delerzyga³, M. Smoluchowski Institute of Physics, Jagiellonian University (PL); PRISME Institute EA 4229, Université d’Orléans (FR); GREMI - Site de Bourges, Université d’Orléans (FR). The interest in composite materials with embedded metal nanoparticles (MNPs) has grown considerably because of their numerous applications in different fields of science and technology such as optical elements, nanophotonic devices or biomedical sensing and labelling. These applications are based on unique optical properties of MNPs dominated by coherent oscillations of conduction band electrons in response to the electromagnetic field of light.</td>
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### Notes

- Incorporation of diamond particles in the BCB bonding layer of a hybrid system composed of III-V device on SOI leads to increased thermal dissipation.

### Poster Session II

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<th>Session</th>
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<tr>
<td>TOM3_3621_16</td>
<td>High temporal resolution of the ring down of SOI wire racetrack resonators</td>
<td>T.J. Karle¹, F. Raineri², F. Bordas², J. Sivan², S. Alli³, Y. Hallyoua³, G. Foeleken³, R. Raj³, Laboratoire de Photonique et de Nanostructures (FR), IMEC/Ghent University (BE), Photonics and Nanostructures (FR), Université Paris-VIII (FR). The temporal ringdown of Silicon-on-insulator racetrack resonators is measured for input pulses of duration 150fs using a parametric amplification technique. This allows us to study the coupling between the bus waveguide and the racetrack. A cavity round trip time of 660fs and Quality Factor of 9500 are determined.</td>
</tr>
<tr>
<td>TOM3_3624_17</td>
<td>Improved Thermal Dissipation in InP Wire Photonic Crystal Laser on Silicon by Addition of Diamond Nanoparticles in Polymer Bonding Layer</td>
<td>A. Baziri¹, Y. Hallyoua³,², P. Moreiner⁴, F. Bordas², T.J. Karle¹, S. Perruchas², F. Gacio³, H. Girard³, I. Sagnes³, R. Raj³, F. Raineri², Laboratoire de Photonique et de Nanostructures (FR), IMEC/Ghent University (BE), Groupe de Chimie du Solide, Ecole Polytechnique (FR), Université Paris-Diderot (FR). Incorporation of diamond particles in the BCB bonding layer of a hybrid system composed of III-V device on SOI leads to increased thermal dissipation.</td>
</tr>
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### Notes

- Analysis of the 3D degree of polarization of highly focused light fields | R. Martínez-Herrero, J. Fernández, Departamento de Optica, Facultad de Ciencias Físicas, Universidad Complutense de Madrid (ES). On the basis of the angular plane-wave spectrum of the light field, the 3D Stokes parameters (defined in terms of the Gell-Mann matrices) are applied to investigate the 3D degree of polarization of the field at the focal region of a high-focusing optical system. |

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**Exhibition Hall**

- Tuesday, 28 October, 13.30-15.00

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**Thursday, 28 October, 13.30-15.15**

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<tr>
<th>Session</th>
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<tr>
<td>TOM3_3221_18</td>
<td>Analysis of the 3D degree of polarization of highly focused light fields</td>
<td>R. Martínez-Herrero, J. Fernández, Departamento de Optica, Facultad de Ciencias Físicas, Universidad Complutense de Madrid (ES). On the basis of the angular plane-wave spectrum of the light field, the 3D Stokes parameters (defined in terms of the Gell-Mann matrices) are applied to investigate the 3D degree of polarization of the field at the focal region of a high-focusing optical system.</td>
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<tr>
<td>TOM3_3179_19</td>
<td>Transverse beam width of radially-polarized light fields propagating through high-focusing optical systems</td>
<td>R. Martínez-Herrero³, P.M. Mejías³, A. Manjavacas², Departamento de Optica, Facultad de Ciencias Físicas, Universidad Complutense de Madrid (ES), Instituto de Optica, CSIC (ES). On the basis of a formal analogy with the irradiance moments, used as ISO standards for the paraxial beam-width, analytical definitions are proposed for the width associated to both the transverse and the longitudinal components of nonparaxial radially-polarized fields propagating through high-focusing systems.</td>
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**Thursday, 28 October, 15:15-17:00**

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<th>Session</th>
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<td>TOM3_3667_20</td>
<td>Optical antimatter and its detection using holographic microscopy</td>
<td>V. Mocella¹, G. Coppola¹, P. Dardano¹, G. Di Caprio¹, I. Rendina¹, S. Cabriné¹, National Research Council-Inst. For Microelectronics and Microsystems (IT), Molecular Foundry, Lawrence Berkeley National Laboratory (US). In this paper we analyze the very special properties of an heterostructures composed by complementary media. Theory and experimental results obtained at near infrared light wavelength (λ =1.55 µm) are presented. Holographic set-up give a step forward in optical analysis of such a special metamaterial. It is proven that a divergent input source is transformed into a strongly collimated beam in-plane, vertically well confined. An extremely directive beam in far field is produced out-of-plane, coupled with diffraction order of the grating of alternating complementary media.</td>
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<tr>
<td>TOM3_3279_21</td>
<td>Morphology-dependent resonances in 2D nanoparticles. Effects on extraordinary transmission in subwavelength slits</td>
<td>F.J. Valdivia¹, P.M. Mejías³, P. Caprio¹, Inst. for Microelectronics and Microsystems (IT), Molecular Foundry, Lawrence Berkeley National Laboratory (US). We address different sets of either dielectric or metallic nanocylinders in front of a subwavelength metallic slit. Next, we extend this study to photonic crystals close to gratings of such slits. The effects on light transmission and localization in the system when morphology-dependent resonances are excited in the particles, are analysed.</td>
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</table>
based on the combination of Fractal Zone Plates (FZPs) at different orders. It is shown that MFZPs improve the axial resolution and also give better performance than FZPs.

Student presentation

Generalizing the Devil’s Lenses
A. Calatayud,1,3 W.D. Furlani,1 A. Pons,2 O. Mendíaz-0-Yero,3 J.A. Monsoriu1
1. Faculty of Physics, University of Warsaw (PL), 2. Institute of Electronic Materials Technology (PL), 3. School of Engineering and Physical Sciences, Heriot-Watt University (UK).

In this paper, we study the effects of the trans- verse properties of a Gaussian beam on coherent multiplexed systems. We show that the divergence of a Gaussian beam introduces an additional crosstalk between light fields.

Student presentation

Dual band optical equaliser for multiplexed transmissions
S. Dupont1,2,3, J.C. Kostelik1,2,3, M.S. Sahli1,2,3, J. Gazzarri1,2,3,1. Univ. Lille Nord de France (FR), 2. UVHC, IEMN-DOAIE (FR), 3. CNRS, UM 8520 (FR).

An optical equaliser working both for 1300 nm and 1550 nm fibre transmission bands has been designed and characterized: real time equalization is fully automatic and a single operation step is necessary to get equalisation. A full dynamic of 20 dB can be obtained through the entire CWDM band with optical polarisation insensitivity. The operation principle is based on the assembly two acousto-optic cells in cascade.

Student presentation

Quanticoque et Moléculaire, UMR 8537 CNRS (FR).


tomographic approach, the near field response close to the surface is composed of a linear combination of elementary hybrid waves, which are shown to solely depend on the frequency and to be merely independent of the incident illumination and of the scatterer geometry.

Student presentation

Gaussian Beam Divergence Effects on Crosstalk in Coherence Multiplexed System
S. Elwardi,1,2,3 M. Zaphiriou, B.E. Benkelfat1,1. Institut Télécom, Télécom SudParis SAMOVAR UMR INT-CNRS 8517 (FR), 2. Engineering School of Communications of Tunis, SupCom (TN).

In this paper, we study the effects of the trans-verse properties of a Gaussian beam on coherent multiplexed systems. We show that the divergence of a Gaussian beam introduces an additional crosstalk between light fields.

Student presentation

New single step nanostructures printing in azopolymer materials
I. Apostoloi,1 V. Damiani1, N. Hurdur;1. National Institute for Lasers, Plasmas and Radiation Physics (RO), 2. Technical University of Iasi, Department of Natural and Synthetic Polymers (RO).

Photonic processing of micro and nanointegrated structures based on photoinduced conformational changes of the azobenzene functionalized polymer films is presented. We have obtained surface relief modulation of azopolymeric films from d-10 nanometers to hundreds of nanometers as a function of the irradiation conditions.
**Poster session**

**TOM 4**

**POSTER SESSION I**: Wednesday, 27 October, 13:45-15:15

**exhibition hall**

**TOM 3388_07**

**Student presentation**

**TOM 3349_09**

**Experimental Comparison of Acrylamide-based and Polyglaucophanophotographs for Optical Holography**

J. Hopp, P. Fiola; Faculty of Nuclear Sciences and Physical Engineering, Department of Physical Electronics, Czech Technical University (CZ).

We propose a method for optical design of hybrid triplets, e.g. optical systems containing one diffractive optical element (DOE) and two other classical lenses. This method relies on utilization of the aplanatic condition. The aplanatic condition was taken as a main optimizing criterion for the design of phase functions of diffractive optical elements during the optimization procedure. The phase function of the diffractive element can be arbitrary. Several hybrid optical systems, particularly hybrid triplets, were designed and analyzed by this method.

**TOM 3522_08**

**Student presentation**

**TOM 3364_10**

**Student presentation**

**TOM 3362_16**

**Micro and nanoscale patterning of polymers for micro-optica**

P. Obreja, D. Cristea, A. Dinescu, R. Rebigan; National Institute for R&D in Microtechnologies (IMT-Bucharest) (RO).

Polymer materials are used in optoelectronic devices, due to their refractive index and very low optical loss. The paper presents micro and nanoscale patterning techniques in multilayer filters for fabrication of the micro-optical components with 3D complex shape in polymer optical resins.

**TOM 3584_17**

**Self-enhancement and angular properties of vector and scalar gratings in organic glasses**

A. Ozols, V. Kokars, P. Augustova, O. Maldarovs, K. Traskovskis, E. Zarina; Faculty of Material Science and Applied Chemistry, Riga Technical University (LV).

Self-enhancement of vector and scalar holographic gratings recorded in different organic molecular glasses have been experimentally studied. Diffraction efficiency (DE) angular dependence of these gratings was also studied and compared with theoretical calculations.

**TOM 3518_15**

**Digital holographic microscopy for vapour etching micro-lens characterization**

M. Mihaleasca, I. Bocca, A. Saborciu; Phys. Depart. "Politehnica" Univ. from Bucharest, Department of Physics (RO).

In this paper, a simple and low-cost technique to fabricate spherical micro-lenses in glass is presented. A multi-steps profile is obtained based on several masks made using e-beam lithography and several chemical processes. The continuous profile obtained after warming up at the optimum temperature, is analyzed using digital holographic microscopy. We investigated the influence of the distance between sample and the microscope objective in the contrast of the recorded hologram and in the digital reconstruction of the object image.

**TOM 3465_11**

**Fast evaluation of the PSF for Fresnel zone plate imaging in transmission X-ray microscopy**

O. Mendoza-Yero, G. Mínguez-Vega, R. Navarro; J. Lancis, V. Climent; Department of Physics, Universitat Jaume I (ES), Faculty of Sciences, ICMA, CSIC-University of Zaragoza (ES).

We introduce a suitable analytical approach for the evaluation of the PSF of a zone plate typically used in transmission X-ray microscopes (TXM). The computation time is quite reduced in comparison with the formalism based on the Lommel functions. Numerical computations generate accurate results for 3D imaging.

**TOM 5517_12**

**Opto-fluidic apertures and shutters with the potential for an integrated electrowetting actuation**

P. Muller, A. Klass, H. Zappo, W. Mönch; Department of Microsystems Engineering (IMTEK), University of Freiburg (DE).

Relying on the high optical absorption of aqueous pigment dispersions, we demonstrate tunable optical apertures and shutters of high contrast. Our very flexible fabrication process uses dry film resist and full wafer bonding to define micro-fluidic structures and allows integrated electrowetting actuation.

**TOM 3311_13**

**Optical data storage induced by superresolution focal volume through focusing a radially polarized beam**

X. Li, M. Gu; Centre for Micro-Photonics, Faculty of Engineering and Industrial Sciences, Swinburne University of Technology (AT).

Multi-layer sub-diffraction optical recording has been experimentally demonstrated with an achieved capacity of 0.76 Terabit/cm³ by focusing a radially polarized beam. This was achieved by increasing the annular aperture to optimize the volume of the focal spot, therefore leading to an enhanced storage density limit.

**TOM 4**

**POSTER SESSION II**: Thursday, 28 October, 13:30-15:00

**exhibition hall**

**TOM 3358_14**

**Red blood cells statistic under UV-VIS irradiation monitored by digital holographic microscopy**

M. Mihaleasca, I. Bocca, E. Scarlat; "Politehnica" University from Bucharest, Department of Physics (RO).

In the present work, a statistic on UV-VIS irradiated/not irradiated blood samples is reported. The study address on mature and immature red blood cells weights in the total number, as revealed by their dimensions and shapes monitored by digital holographic microscopy (DVM) technique.

**TOM 3518_15**

**New types of holographic diffraction gratings**

N.K. Pavlychev; Kazan State Technical University by name A.N. Tsyplakov (RU).

Two types of aberration correction holographic diffraction gratings are described. It is the diffraction gratings recorded by the aspheric wave fronts and the concave transmission holographic diffraction gratings. Particular optical schemes for spectrographs and their aberration characteristics are considered.

**TOM 3258_19**

**Micro-fabrication of Graded Filters**

A. Piegari, A. Sytchkova, J. Bullin; ENEA, Optical Coatings Group (IT), “Institute of Physics, Academy of Sciences” (CZ).

Traditional optical components could be substituted, in specific measurement instruments, by miniaturized optical filters to reduce the instrument dimension and weight. Graded thin-film filters offer a tool for a possible miniaturization. Both fabrication and characterization of these small-dimension filters will be discussed.

**TOM 4**

**POSTER SESSION III**: Thursday, 28 October, 13:30-15:00

**exhibition hall**

**TOM 3449_09**

**Experimental Comparison of Acrylamide-based and Polyglaucophanophotographs for Optical Holography**

M. Kvetolfi, P. Fiola; A. Havranek; Faculty of Nuclear Sciences and Physical Engineering, Department of Physical Electronics, Czech Technical University in Prague (CZ), Faculty of Mathemat- ics and Physics, Department of Macromolecular Physics, Charles University, Faculty of Mathemat- ics and Physics (CZ).

Characteristics of acrylamide-based and Poly- glaue (SM-S32TR S1) photopolymer recording materials for optical holography have been experimentally studied. The curves, that describe the growth of a diffraction grating in a realtime, have been measured for different exposition conditions and compared.

**TOM 3260_18**

**New types of holographic diffraction gratings**

C. Ulysse, M. Lebental; Laboratoire de Photonique Quantique et Moléculaire, Ecole Normale Supérieure de Cachan, CNRS UMR 8537 (FR), Laboratoire de Photonique et de Nanostructures, CNRS UPR20, Route de Nozay (FR), Laboratoire Analyse, Géométrie et Applications, Université Paris 13, CNRS UMR 7539 (FR).

The existence of at least one periodic orbit in some triangles is still an open question from a mathematical point of view. We used organic microlasers to address this issue with an experi- mental method based on the emitting spectra.

**TOM 3311_13**

**Optical data storage induced by superresolution focal volume through focusing a radially polarized beam**

X. Li, M. Gu, Centre for Micro-Photonics, Faculty of Engineering and Industrial Sciences, Swinburne University of Technology (AT).

Multi-layer sub-diffraction optical recording has been experimentally demonstrated with an achieved capacity of 0.76 Terabit/cm³ by focusing a radially polarized beam. This was achieved by increasing the annular aperture to optimize the volume of the focal spot, therefore leading to an enhanced storage density limit.

**TOM 3311_13**

**Optical data storage induced by superresolution focal volume through focusing a radially polarized beam**

X. Li, M. Gu, Centre for Micro-Photonics, Faculty of Engineering and Industrial Sciences, Swinburne University of Technology (AT).

Multi-layer sub-diffraction optical recording has been experimentally demonstrated with an achieved capacity of 0.76 Terabit/cm³ by focusing a radially polarized beam. This was achieved by increasing the annular aperture to optimize the volume of the focal spot, therefore leading to an enhanced storage density limit.
We describe our initial work on Hartmann Wave Front Sensor (HWFS) as an instrument for detection of wave front aberration in an Extreme Ultraviolet Lithography system (EUVL). We present a mathematical model of this system which demonstrates the feasibility and the possible advantage in terms of dynamic range and accuracy of this technique compared to interferometric techniques.

Design of a Fourier transform micro-spectrometer by means of thermally actuated grating light valve in a waveguide structure

We prepared polystyrene artificial opals infused with a liquid with high dependency of refractive index to temperature. By changing temperature by applying current to a thin film heater, the efficiency and the 0th order of diffraction which is coupled into the output port is changed. Fourier transform of the output intensity, shows the spectrum of the input light.

Highly polarized emission from oriented self-standing films of conjugated polymers

Highly oriented polyvinyl alcohol films doped with conjugated polyelectrolytes are presented here. Steady-state and time-resolved spectroscopy reveal that the photoluminescence is strongly polarized (~95%) along the orientation axis. An application of these films as polarizing filters is proposed.

Single crystals versus nanocrystals in hybrid organic-inorganic photovoltaics

Photovoltaic (PV) responses from hybrid organic-inorganic interfaces are shown to have different origin depending on whether bulk single crystals giving rise to the flat geometry of the hybrid interface or nanocrystals with the bulk heterojunctions are used. Examples are given for hybrid structures based on Si and some II-VI crystals.
Poster session

TOMS_3473_04
Linear and cyclic porphyrin hexamers as low energy gap emitters in near-infra-red light-emitting diodes
O. Fenwick1, J. Binns1, J. Sparkle2, D. Kondratuk3, F. di Stasio1, H.L. Anderson1, F. Cacialli1,1
1Department of Physics and Astronomy and London Centre for Nanotechnology (UK);
2Department of Chemistry, University of Oxford, Chemistry Research Laboratory (UK).

We present near-infra-red light-emitting diodes incorporating porphyrin hexamers as emitters in blends with F8BT. We have studied both linear and cyclic hexamers and obtain near-infra-red emission from the linear hexamer with an external quantum efficiency (EQE) of 0.1±0.01%.

TOMS_3476_06
Near Infra-red light-emitting diodes and infrared sensitised solar cell incorporating selenium doped conjugated polymers
O. Fenwick1, O. Breuer2, S. Yilmaz1, S. Allard1, U. Scher1, F. Cacialli1,1
1Department of Physics and Astronomy and London Centre for Nanotechnology (UK);
2Bergische Universität Wuppertal, Fachbereich Physik (DE).

We present devices based upon two selenium doped polymers, BS and T8T, which emit in the near infra-red (NIR) part of the spectrum. In blended devices, we obtain NIR emission (peak 800-900 nm) with external quantum efficiencies up to 0.3±0.1%.

TOMS_3525_05
Comparison of the heat exchange between a Wollaston wire probe and a relatively heated AFM probe
G.M. Lazzarini, O. Fenwick, F. Cacialli1,1
Department of Physics and Astronomy and London Centre for Nanotechnology, University College London (UK).

With a view to thermal lithography applications we make use of finite element analysis to model the heat exchange between two different kinds of probe and a polymer substrate on quartz. A commercial AFM tip and a Wollaston wire probe are compared by looking at the effect of their shape on the total heat exchange and the lithographic pattern resolution.

TOMS_3418_08
Nonconventional properties of dyes in polytetrafluoroethylene matrix
K. Grytsenko1, S. Schroder2, O. Tolmachev1, Yu. Stolminskii3, V. Barachevsky4, O. Kablov5
1Institute of Semiconductor Physics, Department of the Optoelectronics of the Semiconductor Molecular Systems (UA); 2Institute of Applied Sciences Wildau (DE); 3Institute of Organic Chemistry, Department of Dye Color (UA); 4Photochemistry Center of the Russian Academy of Sciences YRF.

Thin films of polytetrafluoroethylene (PTFE) filled with squaraine, stilbene, polyethylene and photodarkening at various concentrations, were obtained by co-deposition in vacuum. PTFE matrix enhances many useful properties of dyes, including stability to action of external factors.

TOMS_3151_10
Tuning the optical properties of Au nanoparticles embedded in PTFE film
V. Ksenzov1, S. Schroder1, H. Beyer2, K. Grytsenko1, S. Bous-Vedrenne3, G. Garry1
1University of Applied Sciences Wildau (DE); 2THALES Research & Technology France, Campus Polytechnique (FR).

Gold-filled polytetrafluoroethylene (PTFE) films filled with gold (Au) nanoparticles (Np) were deposited in vacuum. The Au Nps size and optical properties of their ensemble can be tuned by varying deposition conditions, Au concentration, annealing temperature or power of laser treatment.

Notes

TOMS_3418_12
Fluorescence quenching in gold / Rh 6G nanoassemblies: an analysis of nanoparticles concentration
L. Dong1, J. Hu1, F. Ye1, S. Popov1, A.T. Friberg1,2,3, M. Muheim1,1
1School of Information and Communication Technology, Royal Institute of Technology (SE); 2Zhejiang University, Center for Optical and Electromagnetic Research (CN); 3Department of Applied Physics, Aalto University (FI); 4Department of Physics and Mathematics, University of Joensuu (FI).

Depending on size and concentration, nanoparticles can supress dye lasing properties due to increased quenching of the excited molecules. Here we report experimental results of the fluorescence degradation depending on the nanoparticles concentration.

TOMS_3222_13
Photoelectrical and optical properties of thermocatable polyphtohenes
J. Toutek1, J. Toutková1, Z. Remeta1, S.A. Gevorgyan1, F.C. Krebs2,3
1Charles University in Prague, Faculty of Mathematics and Physics, Department of Macromolecular Physics (CZ); 2Institute of Physics of the Academy of Sciences of the Czech Republic (CZ); 3Technical University of Denmark, Risø National Laboratory for Sustainable Energy (DK).

The surface photovoltage (SPV) method was applied to three different thermocatable polyphtohenes, namely P3HMHCT, P3CT and PT to find the diffusion length of generated excitons. Optical absorption and reflection spectra needed for the evaluation were also measured.
Monitoring micrometer-scale collagen organization in tendon upon mechanical strain by use of second harmonic generation microscopy


*École Polytechnique, Laboratory for Optics and Biosciences (FR); **École Polytechnique, Solid Mechanics Laboratory (FR).

We combined polarization-resolved nonlinear optical microscopy and tensile experiments to visualize the microscopic structure of rat-tail tendon while measuring mechanical properties. For that purpose, we targeted two aspects of intrinsic second harmonic generation in fibrillar collagen to image the crimp pattern and measure the tissue anisotropy during loading cycles.

Design and characterization of nitride-based waveguides for optical switching operating at 1.5 µm


*L能力和 Optique, INSA, Université Lyon 1 (FR); **Physique et Astronomie Department, Faculty of Sciences, University of Porto (PT); ***INESC Porto (PT).

We report on the design, fabrication and optical characterization of GaN/AlN quantum-well based waveguides for optical switching. Design is performed taking into account both optical and electrical confinement effects. For the optimized structures, an expected effective area is estimated as 4 µm2.

Hyper Rayleigh Scattering: a means for investigating the growth mechanism of nanocrystals with quadratic optical properties in reverse micellar solution route synthesis


*Laboratoire Systèmes et Matériaux pour la Météorologie, Université de Savoie (FR); **UMR CARTEL (INRA/Université de Savoie), Laboratoire de Microbiologie Aquatique (FR); *Institut Jean Lamour, UMR CNRS 7198, Nancy Université (FR).

The proposed contribution shows that Hyper Rayleigh Scattering measurements can be a very valuable tool for monitoring the synthesis on nanocrystals with quadratic optical properties during their formation when using a reverse micellar route.

Temporal and spectral coherence of supercontinuum light


*University of Eastern Finland, Department of Physics and Mathematics (FI); Tamper University of Technology, Optics Laboratory (FI); Aalto University, Department of Applied Physics (FI);

Approximate area is estimated at 4 µm2.

Nonlinear optical biosensor of liver surfaces for monitoring fibrosis progression


*Institut de Bioengineering and Nanotechnology, A*STAR (SG); **Singapore-MIT Alliance, Ed-D4-10 (SG); **School of Computer Engineering, Nanyang Technological University (SG).

Liver biopsy is the current gold standard for monitoring fibrosis progression in patients with liver diseases. A two-color laser field is proposed for the second-order nonlinear optical biosensor of liver surfaces for monitoring fibrosis progression. The spatial coherence properties of supercontinuum (SC) light pulses using second order coherence theory is presented. The presented contribution shows that Hyper Rayleigh Scattering measurements can be a very valuable tool for monitoring the synthesis on nanocrystals with quadratic optical properties during their formation when using a reverse micellar route.

Nonlinear optical properties of silicon nanowaveguides

A. Barari*, N. Dubreuil**, P. Delay**, G.P. Agrawal*, Laboratoire Charles Fabry de l'Institut d'Optique, CNRS, Univ Paris-Sud, Campus Polytechnique RD126, 91120 (FR); Institute of Optics, University of Rochester (US).

We present a theoretical analysis, which predicts the decrease of the effective Raman gain coefficient owing to self-phase modulation induced by the Kerr and free-carrier effects, taking into account two-photon absorption of the pump energy in the case of silicon nanowaveguides. This model agrees with our experimental data.

On the orbital angular momentum of light in a quadratic nonlinear interaction of off-axis vortex beams

F.A. Bovino*, M. Braccini**, C. Sibilia**. "Etage Datomat (IT); "Sapienza University of Roma, Dipartimento di Energetica (IT).

A study on the evolution of optical on-off and off-axis vortexes generated by spiral phase plates is presented, emphasizing the properties of orbital angular momentum in the linear and nonlinear cases.
**Poster session**

**TOM6_3542_14**

Nonlocal dynamics of photoinduced waveguides in biased photorefractive media

V. Coda, M. Gorrasi, G. Montemaggi, F. Devaux, M. Chouvet; Laboratoire Matériaux Optiques, Photonique et Systèmes (L MOMPS), Université Paul Verlaine – Metz et Supeléc (FR); Département d’Optique, Institut Femto-ST, UMR CNRS 6174, Université de Franche-Comté (FR).

The highly anisotropic buildup of photoinduced channel waveguides in biased photorefractive media is studied for different geometries and analyzed using a time-dependent 3D numerical model. The observed dynamic reveals that transient index profiles differ from steady-state ones, specially for the case of one-dimensional illumination.

**TOM6_3524_15**

Slow- and fast light in a photorefractive SBN crystal

W. Horn, J. Basseiwy, C. Denz; Westfälische Wilhelms-Universität, Institut für Angewandte Physik and Center for Nonlinear Science (DE).

We demonstrate slow and fast light by dispersive phase coupling in a photorefractive Strontium Barium Niobiate crystal. The gain spectrum is modulated by using multiple frequency-shifted pump beams. The complete dispersion curve is measured by the phase modulation technique.

**TOM6_3530_16**

High average power solid-state Raman laser in near IR region

V. Lisinetakis, B. Chulkov, O. Lux, H. Rhee, S. Schroder, H.J. Eichler, V. Orlovich; University of Applied Sciences Wildau, Engineering Physics (DE); B.I. Stepanov Institute of Physics, NAS of Belarus (BY); TU Berlin - Institut für Optik und Atomare Physik (DE).

High average power barium nitrate Raman laser pumped with Nd:YAG laser radiation is presented. The output average powers of 17 W, 9.5 W, and 5.5 W were obtained for the wavelengths of the first, second, and third Stokes correspondingly. The thermal lens arisen during the Raman generation was investigated.

**TOM6_3420_17**

Investigation of Raman threshold conditions in bulk silicon

1. University of Applied Sciences Wildau, Engineering Physics (DE); 2TU Berlin - Institut für Optik und Atomare Physik (DE).

Raman threshold calculations for bulk silicon in conditions of long free-carriers life-time were performed. Single-pass generation and Raman laser were considered. Ways for decreasing of Raman threshold in bulk silicon are discussed.

**TOM6_3603_19**

Ultra-High Conversion Efficiency and Low Lasing Threshold Chalcogenide Waveguide Raman Laser for Optical Interconnect

Y. Huang, M. Tang, F. Luan, P. Shum, Ch. Lin; 1Network Technology Research Centre, School of Electrical and Electronic Engineering, Nanyang Technological University (SG); 2NanoPhotonics Lab, Extreme Photonics Department, Advanced Science Institute (JP).

Chalcogenide waveguide Raman laser are comprehensively investigated as a promising solution for optical interconnect laser source. Compared to silicon laser, an order of magnitude conversion efficiency enhancement and 33% threshold reduction are simultaneously achieved within waveguide miniaturization to 35um.

**TOM6_3180_20**

Nonlinear and saturable absorption characteristics of amorphous InSb thin films

M. Yüksel, U. Küçüm, H. Guf Yaglıkoglu; 1Ankara University (TR); 2Department of Physics, Science Faculty, Atatürk University (TR).

We prepared very thin amorphous InSb films and investigated the thickness dependence of the nonlinear absorption by pump-probe and open aperture 2-scan techniques. While thinner films (20 and 52 nm) exhibit saturable absorption, thicker films (70 and 104 nm) exhibit nonlinear absorption for 4 ns, 65 ps, and 44 fs pulse durations. This behavior is attributed to increasing localized defect states in the energy band gap as the film thickness increases.

**TOM6_3458_22**

Femtosecond second harmonic generation with wavelength tunability by using diffractive lenses

G. Mínguez Vega, J.R. Vázquez de Aldana, O. Mendoza, C. Mendoza, C. Romero, B. Borrego-Variillas, J. Lencic, V. Cli-n, L. Roso; 1Dept. of Física Aplicada, Universidad de Salamanca (ES); 2Centro de Láseres Pulsoados Ultra cortos Ultraintensos (ES).

We demonstrate that kinoform diffractive lenses (DL) can be used as a simple method to tune the central wavelength of femtosecond pulses generated in a second harmonic (SH) experiment with birefringent crystals. It is done thanks to the on-axis displacement of the nonlinear crystal in the vicinity of the focal position of the DL.

**TOM6_3447_23**

Nonlinear second harmonic generation of fiber lasers radiation

K. Regelb, R. Trusov, J. Zeludcickis, N. Gavrill, G. Raciukaitis; Center for Physical Science & Technology (LT).

In this work nonlinear generation of second harmonic using output of two fiber amplifiers in nonlinear KTP (TiOPO4) crystal was investigated. 60 % conversion efficiency and 66 μJ pulse energy was achieved.

**Notes**

**TOM6_3466_21**

Spatialtemporal characterization of the waveforms generated by the quasi-direct space-to-time pulse shaper

V. Loriot, O. Mendoza-Yero, G. Mínguez-Vega, E. Tajahuerce, L. Baltarets, R. de Nolda; 1Instituto de Química Física Roiscoiano, CSIC (ES); 2Departamento de Química Física, Facultad de Ciencias Quimicas, Universidad Complutense de Madrid (ES); 3Departamento de Físico, GROC-UJI, Universitat Jaume I (ES).

Using a space-resolved 4th order cross-correlation technique combined, we obtain experimentally the three-dimensional (3D) intensity map of the output collimated pulse from the quasi-direct space to time (QDST) pulse shaper.
Nonlinear Absorption of Ultrashort Laser Pulses of Ultrarelativistic Intensities in Underdense Plasma due to Inverse Bremsstrahlung of Electrons on the Ion/Nucleus: Theoretical Modeling of an Open Aperture Reflection Z-Scan on Media with High-Order Optical Nonlinearities

A. Pastor1,2, V. Vlad1, National Institute for Laser, Plasma, and Radiation Physics, Dept. of Lasers (RO); The Abdus Salam International Centre for Theoretical Physics (IT). We present the first analytic description of open aperture reflection Z-scan in media with high-order nonlinearities. An expression for the normalized reflectance is derived and its consequences are discussed. A simulation using our formula and data from literature for high-order nonlinear refractive indices of As2S3 is performed.

Micro-Raman and Micro-luminescence Spectroscopy of Different Types of Lithium Niobate Waveguides

J. Villarreal1, S. Mignon1, M. D. Fontana2, M. Carrascosa1, A. García-Cabañas1, J. Olivares2, F. Agulló-López1, Universidad Autónoma de Madrid, Dept. Física de Materiales (ES); Universidad Paul Verlaine Metz, LMOPS (FR); Universidad Autónoma de Madrid, CAMA (ES). Micro-Raman and micro-luminescence spectroscopy have been investigated on different types of UNiO3 waveguides. Specifically, proton-exchange (PE), reversed proton-exchange (RPE), and swift-heavy-ion (SHI) irradiation waveguides have been analyzed in reference to the behaviour of a congruent UNiO3 substrate.

Coupling between Filament-Forming beams in Liquid Methanol

B.D. Stroyer, M. Springer, C. Trendafilova, M. Zhu, A.V. Sokolov, G.W. Kattawar, Texas A&M University, Institute for Quantum Studies and Department of Physics (US). We demonstrate pulse energy exchange between two filament-forming beams in liquid methanol. Our results are consistent with those of previous works, and, in addition, we have identified a previously unreported energy-exchange phenomenon occurring at increments in relative delay between the pulses of half an optical period (1.3 fs).

Generation of Broadly Tunable Sub-30-fs Infrared Pulses by Four-Wave Optical Parametric Amplification

J. Dargiavvili, E. Rubino1, D. Faccio1, P. Di Traprinti, A. Pikarskas5, and A. Dubietis5, Department of Quantum Electronics, Vilnius University (LT); A. Pikarskas5 and A. Dubietis5, Department of Physics and Mathematics, Università dell’Insubria (IT). We report on the generation of sub-30-fs near-infrared light pulses by means of broadband four-wave parametric amplification in fused silica. The amplifier is seeded by broadband visible pulses and produces up to 20 μJ infrared idler pulses tunable from 1 to 1.5 μm. The shortest pulse duration is 17.6 fs, measured at 1.2 μm.
A theoretical study of q-plates and possible applications in nematic liquid crystals and hybrid photomaterial optical devices.


Methods of the measuring accuracy estimation in the stereoscopic system for the control of objects displacements.

K.G. Arakantev, E.M. Bogatinskiy, A.A. Gorban, I.A. Konyakhin, V.V. Korotaev; Saint-Petersburg State University of Information Technologies, Mechanics and Optics, Department of the Optic-electronic Devices and Systems (RU).

Electrical activation of amorphous silicon on glass using microwave annealing for the application of thin film solar cells.

H.Y. Chen, Y.J. Lee, C.P. Chang; 1Huafan University, Department of Electronic Engineering (TW), 2National Nano Device Laboratories (TW). A 5.8 GHz microwave annealing (MWA) is employed to electrically activate the doped amorphous silicon (a-Si) thin films on glass. MWA can electrically activate better the doped a-Si films at low annealing temperature and short processing time and effectively reduce their resistivity. The longer annealing time for MWA is better.

Notes
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