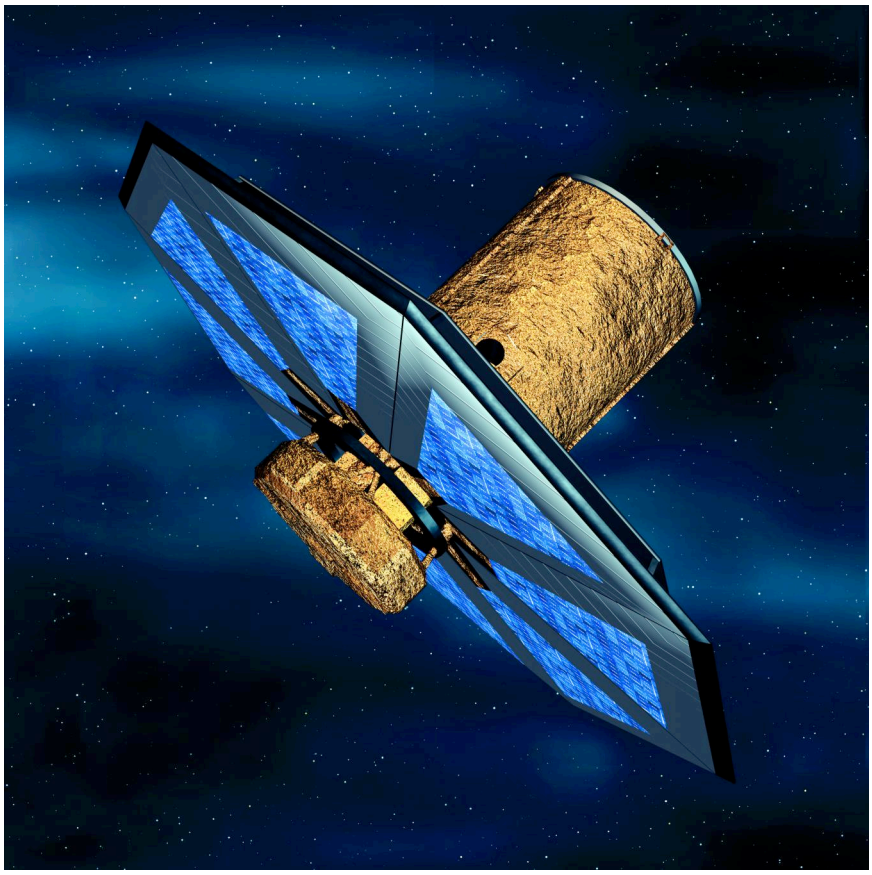
SSOM

Swiss Society for Optics and Microscopy

Société Suisse pour l'Optique et la Microscopie

Schweizerische Gesellschaft für Optik und Mikroskopie

Mitteilungsblatt/Bulletin d'information 4/2006



Photonics in Space

12th SSOM Engelberg Lectures on Optics

5-7. March 2007, Engelberg, Switzerland

SWISS SOCIETY FOR OPTICS AND MICROSCOPY

www.ssom.ch

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Biomedical Optics

From the president

Dear member,

We are proud to announce that our board member **Hans Peter Herzig** is now Vice President (president elect) of the EOS board. That means that he will be president in two years time. **Christian Schönenberger**, an other board member of the SSOM was appointed director of the new Swiss Nanoscience Institute SNI. We congratulate our colleagues and wish them success in their new honourable positions.

Soon we are coming to the end of the year, time to look back at the activities of our society.

On 27-29 March there was the "**EOS Topical Meeting on Molecular Plasmonic Devices**" in Engelberg. This international meeting was organized by the SSOM and the European Optical Society (EOS), and brought together 88 leading scientists from industry and research institutes. The number of new and exciting results reported made it a great success, and we are looking forward to further meetings on related topics.

From 30 July to 4 August the **ICN&T**- International Conference on Nanoscience and Technology took place in Basel. It was one of the most important gatherings of the nanoscience community of the year. Over 1400 scientists participated.

For the microscopists the top event was the **1 6th International Microscopy Conference**, **ICM16**, held in Sapporo, Japan, from 3-8 September. Over 2000 scientists from more than 50 countries took the trip to Japan. One of the highlights was surely the Congress Ceremony, where His Majesty the Emperor gave an encouraging address. The next International Conference, IMC17, will take place 2010 in Rio de Janeiro.

On 21 September the Optics section met at the ETH Zurich for the section meeting and the Microscopists will meet at the Microscopy Imaging Center (MIC) of the University of Bern, on 12 December .

Next year there will be a **General Assembly** in Basel, probably during the Annual Congress of the SCNAT. We can celebrate the 300th birthday of Leonhard Euler and we may have the pleasure to award three prizes: The Leica Geosystems Prize (for the 6th time), the SSOM Prize for the second time, and after 1999 also for the second time the GMP Prize. The announcement will soon be made.

And don't forget the **12th SSOM Engelberg Lectures on Optics** from 5-7 March. This years topic will be "Photonics in Space".

The SSOM board wishes all its members a Merry Christmas and a Happy New Year.

With best regards,

Kurt Pulfer

President SSOM

In the field of linear optics, the resolution in far-field optical microscopy is fundamentally pinned down to half of the operating optical wavelength. To overcome this limit, creativity in applied nanoscale science and nanotechnology brings up novel tools through high precision engineering of prototype devices. Resonant optical antennas [1] are such structures. Their architecture is inspired by their radio waves counterparts. Moreover, their design combines synergetically i) impedance matching of optical waves mediated by the effective length of the antenna arms and ii) electromagnetic field confinement and enhancement defined by the size of their feed gap width. Controlling well-designed, sub-wavelength confined and enhanced optical fields is the key for opening the door to new standards in optical characterization, manipulation and optical information processing. Furthermore, impedance matching of optical frequencies down to single chromophore sizes opens an efficient pathway to transfer near-field information into the optical far-field detection zone, and vice versa – instrumental for optical microscopy well-beyond the diffraction limit.

In this article, we present a concept for engineering half-wavelength optical bow-tie antennas at the apex of an atomic force microscopy (AFM) cantilever. Furthermore, we demonstrate an application of these bow-tie optical antennas as a scanning near-field nanotool to the imaging of single CdSe nanocrystals at ambient conditions. Thereby we show that the photoluminescence emission rate of individual quantum dots is drastically enhanced when scanned across the antenna feed gap while at the same time their excited-state lifetime is reduced. The optical resolution (≈ 50 nm) is primarily determined by the width of the optical antenna feed gap.

Scanning optical bow-tie antennas have been engineered in a two-step process. First, aluminum is thermally evaporated in an evaporation chamber onto an AFM cantilever forming a thin (≈ 40 nm) metallic layer. In a second step, we take advantage of modern micro- and nanofabrication tools such as focused ion beam milling (FIB). We created a well-defined nanometric metal structure by removing parts of the extended thin metallic film leaving behind the desired bow-tie antenna pattern.

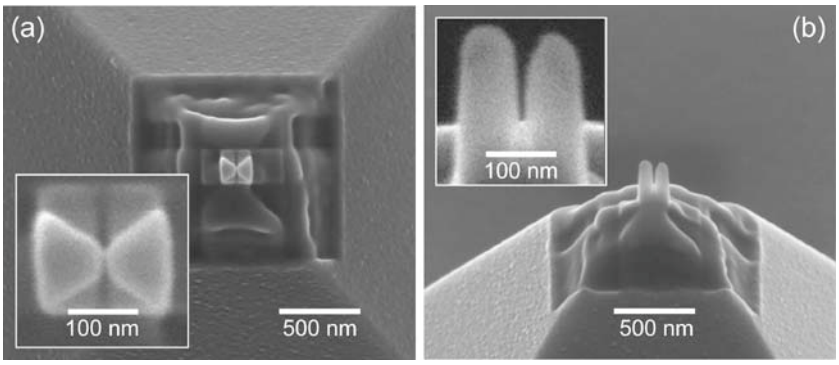

Figure 1: Optical antenna at the apex of an AFM tip. (a) Top, (b) side view. Dimensions: aluminum thickness 40 nm; antenna overall length, 170 nm; and antenna feed gap width, ≈ 50 nm; radius of curvature at the antenna feed gap, 30 nm.

The antenna feed gap can be utilized as the nanolocation for an electromagnetic field confinement and enhancement - clearly well-beyond the diffraction limit of light. These localized and enhanced fields are a toolbox to start gaining control on the fundamental

opto-electronic response functions of single chromophore systems, such as a single CdSe nanocrystal. In this case, the spontaneous photoluminescence emission rate can be modified via the changes in density of states of *photon-accepting* photonic modes of the environment [2].

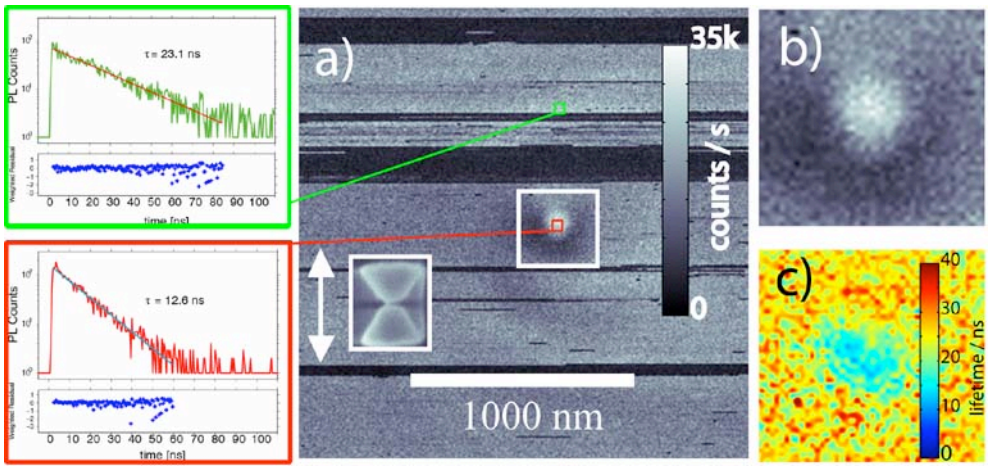

Figure 2: Antenna enhanced emission of single emitters. (a) Emission rate of a single quantum dot as a function of the antenna probe position. A clear enhancement of the emission rate is observed when the quantum dot couples to the antenna. Inset: Antenna size (to scale). The arrow denotes the direction of polarization used for illumination. At the position of the red (left bottom) and the green square (left top) excited-state decay curves are displayed showing a strong reduction of the excited-state lifetime when the quantum dot couples to the antenna. (b,c) Zoom to the area of the large white square in (a) for both the emission rate and the excited-state lifetime.

Creating a novel opto-electronic hybrid structure due to the interaction of a Hertzian dipole, such as a quantum dot, with an optical antenna may lead to an enhanced spontaneous emission rate, while its photoluminescence quantum yield stays at the near unity level – the interaction of the photon-emitting quantum system with an optical antenna does not open dominant, non-radiative de-excitation channels. Therefore, this new hybrid structure may be referred to as a super-emitter [3] or super-molecule.

In conclusion, we have successfully implemented a concept of resonant optical antennas as a novel imaging tool for near-field microscopy using top-down nano-fabrication. We are able to precisely control antenna parameters, such as the antenna arm length, the width of the antenna feed gap and position such structures at the apex of an AFM tip. The interaction of an optical bow-tie antenna with a single quantum dot at ambient conditions confirms the birth of a spatio-temporal opto-electronic hybrid structure, also referred to as a *super-emitter*.

[1] *P. Mühlschlegel et al., Science* ***308*** *(2005)1607*
[2] *E.M. Purcell, Phys. Rev.* ***69*** *(1946) 681*
[3] *J.N. Farahani, Phys. Rev. Lett.* ***95*** *(2005) 017402*

Hans-J. Eisler, Dieter W. Pohl, Bert Hecht

European ICT Prize is launched

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Deadline for application:
4 December 2006

In 2006, "the European Information Society Technologies Prize" changed its name to "the European Information and Communication Technologies Prize", or "the European ICT Prize. It is the most distinguished award for innovative products and services that represent the best of European innovation in ICT.

The Prize is open to companies or organisations which have an innovative ICT product or service with a promising market potential.

The European recognition that stands behind the nomination of Nominees and Winners contributes to facilitating access to finance, markets and partnerships, and to enhancing the visibility, credibility, and the future business prospects for the company.

The European ICT Prize is organised by Euro-CASE with the sponsorship and support of the European Commission. It is open to 33 countries.

www.ict-prize.org

Report SSOM Autumn Assembly Section Optics 2006

Am 21. September 2006 fand an der ETH Zürich in den neuen Chemiegebäuden auf dem Campus Hönggerberg die Herbsttagung der SSOM Sektion Optik statt.

Der Anlass wurde gleichzeitig mit der Jahrestagung der *optETH*-Mitglieder durchgeführt. *optETH* (www.opteth.ethz.ch) wurde 2005 auf Initiative der ETH Zürich gegründet und bezeichnet ein Netzwerk der Optischen Wissenschaften und Technologien, mit dem Ziel die Optikaktivitäten in Forschung und Lehre innerhalb und ausserhalb der ETH zu fördern und zu stärken (s.a. SSOM-Bulletin 1/2006). Die diesjährige Sektionstagung Optik war wiederum verschiedenen Facetten der Optik gewidmet, wobei die Breite und Aktualität dieses Wissensgebietes etwas ausgelotet werden sollten. Die Thematik umfasste sowohl den Raumbereich bis zu kleinsten Dimensionen (Nano-Optik) wie auch den Zeitbereich bis zu kürzesten Lichtpulsen (Femto- bis Attosekunden). Daneben kamen auch Anwendungen insbesondere auf dem Gebiet der “life sciences” zur Sprache. Erfreulicherweise wurde der Anlass von rund 70 Personen besucht, die sich je etwa hälftig aus SSOM und *optETH* Mitgliedern zusammensetzten.

Nach einer Stärkung mit Kaffee und Gipfeli und der Begrüssung durch Hans-Peter Herzig und Markus Sigrist stellte Vahid Sandoghdar (Nano-Optik, Laboratorium für Physikalische Chemie, ETH Zürich (www.nano-optics.ethz.ch)) zunächst die Ideen und Ziele von *optETH* vor, bevor er einige aktuelle Projekte aus seinem Arbeitsgebiet der Nano-Optik und dessen vielfältige Aspekte präsentierte. Einzelmolekül-Nachweis via Laser-induzierte Fluoreszenz, neuste Rasterverfahren und hochauflösende Mikroskopie geben diesem Forschungsgebiet wesentliche neue Impulse. Anschliessend folgte ein Vortrag von Martin Frenz (Biomedizinische Photonik, Institut für Angewandte Physik, Universität Bern, www.iapbp.unibe.ch)) über oszillierende biologische Strukturen wie beispielsweise Flimmerhaare in Atemluftwegen, und wie die Optik auch in diesem Gebiet via Hochgeschwindigkeitsvideo und ausgeklügelter Bildverarbeitung wichtige Beiträge zur Charakterisierung der Zilienbewegung und damit schlussendlich zur medizinischen Diagnose leisten kann.

Vor der Mittagspause bot sich Gelegenheit, Posterbeiträge aus der *optETH*-community zu studieren und mit den anwesenden Doktorierenden über ihre aktuellen Arbeiten zu diskutieren. Die Zusammenlegung mit der *optETH*-Tagung sollte nicht zuletzt ja auch dem Austausch mit Partnern aus Hochschule, Industrie und Wirtschaft dienen, was auch rege benützt wurde. Das anschliessende Mittagessen wurde in der “Cheminsula”, dem Dozentenfoyer auf dem Hönggerberg, eingenommen.

Unter kundiger Führung folgten am Nachmittag die in kleinen Gruppen organisierten Laborbesuche. Zunächst ging es ins FIRST-Labor (**F**rontiers **I**n **R**esearch: **S**pace & **T**ime) mit seinen eindrücklichen Reinräumen, Epitaxieanlagen und Infrastruktur auf dem neusten Stand der Technik. Das FIRST wird gemeinsam von verschiedenen ETH-Departementen und Instituten betrieben und für Forschung und Ausbildung in modernster Mikro- und Nanotechnologie benützt. Es steht aber auch externen Instituten wie auch Industriepartnern zur Verfügung. Anschliessend konnten ausgewählte Labors der Gruppen von Vahid Sandoghdar und Ursula Keller besichtigt werden. Auch hier wurde deutlich, dass die Optik ein hochaktuelles und “trendiges” Fachgebiet ist, das sowohl bei Studierenden auf grosses Interesse stösst wie auch als Basis für viele (auch zukünftige) Anwendungen eine Schlüsselrolle spielt. Im abschliessenden Vortrag diskutierte Ursula Keller (Kurzzeit-Laserphysik, Institut für Quantenelektronik, ETH Zürich, www.ulp.ethz.ch)) ausgehend von einem historischen Abriss der Zeitmessung

die Erzeugung, Charakterisierung, Bedeutung und Anwendungen von ultrakurzen Laserpulsen in den verschiedensten Bereichen.

Ein Apero wurde nochmals ausgiebig für den Gedankenaustausch benützt und beschloss einen eindrücklichen Tag. Aus zahlreichen positiven Äusserungen kann zusammenfassend gesagt werden, dass diese Herbsttagung ein grosser Erfolg war und zur Pflege und zum Knüpfen von neuen Kontakten beigetragen hat. Ich möchte abschliessend nochmals den Vortragenden und Diskussionsteilnehmern für ihre sehr interessanten und stimulierenden Referate und Diskussionsbeiträge sowie den Mitarbeitern für die aufschlussreichen Laborführungen ganz herzlich danken. Ein besonderer Dank gilt auch Andreas Heinle von *optETH* für die wertvolle Mithilfe bei der Organisation. Sie alle haben zum Erfolg dieser Veranstaltung beigetragen.

Markus Sigrist

Final Announcement

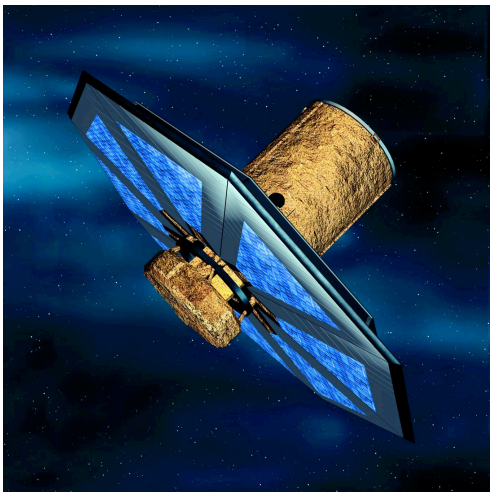
The SSOM Engelberg Lectures on Optics 2007

Photonics in Space: a Challenge for Modern Technologies

12th SSOM Engelberg Lectures on Optics

5-7. March 2007, Hotel Regina Titlis, Engelberg, Switzerland

Organised by:	Swiss Society for Optics and Microscopy SSOM Swiss Space Office SSO
Co-sponsored by :	European Optical Society EOS
Organisation Committee:	B. Braunecker, J. Frauchiger, H. P. Herzig
Contact:	Prof. Hans Peter Herzig hanspeter.herzig@unine.ch



One of Dawin's six telescopes
that is part of the
eight-spacecraft flotilla
(Copyright ESA)

Switzerland plays a strong and active role within the space programmes of the European Space Agency (ESA) and contributes about 135 Million Swiss Francs to these each year. Swiss companies and institutes participate in many current and upcoming programs. The cooperation is fruitful for both sides: ESA benefits from the technological competence of Swiss institutions, while the latter are challenged by the space projects' requirement for cutting edge technologies. The aim of this workshop is to encourage more Swiss institutes and companies to participate in space projects.

To this end, the Swiss Space Office will provide information about existing ESA programmes and policies and sketch future technology needs. The workshop will focus on Photonics: Experts will explain novel ways of taking astronomical measurements at extreme wavelengths, describe new and advanced imaging methods and illustrate the central role played by time and frequency measurements in many applications.

A special session will provide an update on modern optical production techniques, with emphasis on the high-end aspherical components required for new terrestrial and space instruments. By tradition, the SSOM Engelberg lectures are didactic in character. All sections include tutorial information to refresh or complement the knowledge of the audience in the specific fields.

Monday Morning, 5 March 2007 **Advanced Imaging and Spectroscopy**

Chair: K. Knop / CSEM, Neuchatel

Many violent astrophysical processes in our universe may be observed outside the visual spectrum, i.e. at very short wavelengths or in the far infrared. Latest achievements in imaging with γ - and X-rays on the one side, but also at Terahertz frequencies are presented. Future investigations focus on the development of new collimating and detecting schemes. In the second part, new spatial and spectral methods to observe and explore the birth of stars and planets with space- and ground-based telescopes are described in detail. The last talk informs about space- and airborne hyperspectral instruments being well suited for many new remote sensing and imaging tasks.

	Topic	Referent	
08.00 - 08.50	Space based X-ray and gamma-ray Observation	Th. Courvoisier	ISDC, Observatory of Geneva
08.50 - 09.40	THz Astronomy on the Herschel Space Observatory	A. Benz / W. Bächtold	Institute for Astronomy, ETH Zurich
09.40 - 10.20	Coffee Break		
10.20 - 11.10	Stars, Disks and Newborn Planets: Imaging Proto-Solar Systems	A. Sicilia Aguilar	Max-Planck-Institute for Astronomy, Heidelberg
11.10 - 12.00	Hyperspectral instruments and their applications in remote sensing	K. Itten / J. Nieke	RSL, University of Zurich
12:00	Lunch		

Monday Evening, 5 March 2007 **ESA Programmes**

Chair: J. Frauchiger / Swiss Space Office, Berne

In this session the basic mechanisms of the ESA system and an overview of photonics applications on ESA scientific spacecraft are given. The goal is to facilitate the identification of opportunities for the Swiss photonics community to participate in the development of scientific instruments on satellites and preparatory space technology developments. Expected requirements of future scientific missions are shown to transform in technology needs. A selection of those is presented as technology highlights. Nearly all scientific, exploration or application programmes of ESA are supported by specific technology development programmes. The latest developments in common ESA-EU Navigation and Earth Observation initiatives are outlined. This session may support the identification of career opportunities too.

	Topic	Referent	
18.00 - 18-30	Role of Photonics in ESA Space Missions	I. Zayer	ESA-ESTEC/Noordwijk NL
18.30 - 19.00	Prodex Programme	J. Frauchiger	SSO / Berne
19.00 - 19.30	Apero		
19.30 - 20.00	Earth Observation Programmes	U. Frei	SSO / Berne
20.00 - 20.30	Technology Development Programmes	L. de Faveri	SSO / Berne
20.30	Dinner		

Tuesday Morning, 6 March 2007 **Time and Frequency**

Chair: H. P. Herzig / University of Neuchatel

Atomic frequency standards are the basis of today's satellite navigation and positioning systems. Rubidium gas-cell clocks constitute the ideal frequency standard combining short- and medium-term stability with small size, low weight and power consumption. An important role plays the revolutionary frequency comb technology of Nobelprize winner T.W. Hänsch, being meanwhile commercialized as fiber-based optical frequency synthesizer. New optical clocks can be expected with further improved time accuracies. The following lectures address the overwhelming potential of navigation applications performed by space systems and finally present the state of the art of atomic clock technology in GNS systems.

	Topic	Referent	
08.00 - 08.50	Physics of Atomic Clocks	G. Mileti	IMT, University Neuchatel
08.50 - 09.40	Optical Frequency Combs	R. Holzwarth	Max-Planck-Institute for Quantumoptics, Garching
09.40 - 10.20	Coffee Break		
10.20 - 11.10	Potential of Space Based Navigation for Time and Frequency Transfer	R. Dach	AIUB, University of Berne
11.10 - 12.00	Swiss Atomic Clocks within Global Navigation Satellites Systems, Space and Ground Control Segment	P. Rochat	Temex Neuchatel Time SA & T4Science SA
12:00	Lunch		

Tuesday Evening, 6 March 2007 **Swiss Space Projects**

Chair: J. Frauchiger / Swiss Space Office, Berne

Swiss astronomers play a leading role in the detection of ExoPlanets. Their achievements and their methods are presented. Perspectives for new detection schemes and their photonic principles are further elaborated. Photonics for remote sensing missions in the solar system plan is continuously developing and opportunities for in-situ measurement on future exploration missions to Mars or other targets open a new field for photonics applications in scientific instruments. This session includes an ESA presentation on technology developments in preparation of one of the most challenging scientific missions ever to be flown - DARWIN.

	Topic	Referent	
18.00 - 18.45	The HiRISE Camera on Mars Reconnaissance Orbiter and future optical remote sensing systems	N. Thomas	University of Berne
18.45 - 19.30	DARWIN	T. Jagemann	ESA-ESTEC/Noordwijk NL
19.30 - 20.00	Apero		
20.00 - 20.45	Detection and Characterisation of Extra-Solar Planets *)	F. Pepe	ISDC, Observatory of Geneva
20.45	Dinner		

*) To be held as public presentation in German as „Nachweis und Beobachtung von Exo-Planeten“ at the „Kino Engelberg“ (close to the hotel).

Wednesday Morning, 7 March 2007 **Advanced Optics by Aspherical Elements**

Chair: B. Braunecker / Braunecker Engineering GmbH, Rebstein

The main drivers for inserting aspherical elements in optical systems are the quality improvement and a reduction of the number of components. However, the use of aspheres changes the complete value-added chain, from design, materials, processing, metrology to assembly. A broad overview about all these areas will be provided, followed by a special treatment of wide-field imaging lenses and small all-mirror space telescopes. The ESA presentation will highlight the elaborated techniques needed to produce, test and verify the largest monolithic space telescope ever built, the one of HERSCHEL.

	Topic	Referent	
08.00 - 08.50	Aspheres, a new Era in Optics	R. Hentschel	Schott AG / Mainz D
08.50 - 09.40	Modern Production Technology & Metrology	H. J. Tiziani	University of Stuttgart
09.40 - 10.20	Coffee Break		
10.20 - 11.10	Driving Force: Applications	B. Braunecker	Braunecker Eng. GmbH
11.10 - 12.00	Technology Review of Large Space Telescopes	D. Doyle	ESA-ESTEC/Noordwijk NL
12.00	**Lunch and End of Engelberg Lectures**		

Registration Fees

The fees per person include the lectures, accommodation and meals from Sunday evening, 4th of March 2007 (dinner at 20h00) until Wednesday 7th of March 2007 (Lunch):

	Single room
SSOM or full EOS members:	CHF 990.-
Non-members:	CHF 1100.-
Student members:	CHF 800.-
Student non-members:	CHF 910.-

Conference participants in **double room**: CHF 50.- reduction / person for full time attendance.

The workshop is conceived as a unit, single day attendances are not recommended. Exceptions will be charged CHF 450.- per day.

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EOS European Optical Society Coherence for Europe ®

Engelberg Lectures Registration Form

12th SSOM Engelberg Lectures on Optics 2007

Photonics in Space: a Challenge for Modern Technologies

Hotel Regina Titlis, Engelberg, 5 – 7 March 2007

First name, name: …… Title: …….

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Please send the registration no later than 31 January 2007 to:

Madame Mary-Claude Gauteaub
SSOM Engelberg Lectures
Institute of Microtechnology
Rue A. – L. Breguet 2
CH-2000 Neuchâtel

Phone 032 718 3209
Fax 032 718 3201
Email mary-claude.gauteaub@unine.ch

Maximum number of participants: 60
For registrations after January 15th an additional fee of CHF 50.- will be charged

Biomedical Photonics Network goes west to EPFL in Lausanne

The **Photonics Day 2006** on 24th of November was a joint event of the Biomedical Photonics Network (**bmpn**) of the SSOM and the National Competence Center in Research – Quantum Photonics at the EPFL. Photonics is omnipresent at EPFL where it is key to many fields of research, from basic sciences to engineering and life sciences. The meeting was hosted by Olivier Martin from the nanophotonics laboratory and René Salathé from the Institute of Applied Optics of the EPFL. Approximately 80 participants attended a lively meeting in the magnificent Polydôme at the EPFL. Everybody was warmly received with croissants and coffee.

After welcoming words by Olivier Martin, Martin Wolf from the University Hospital Zurich focused in his presentation on clinical applications of biomedical optics. He then introduced the **bmpn** to the audience. Michael Prummer from the EPFL complemented the clinical perspective with events on a much smaller scale and showed cellular interactions by single molecule spectroscopy. The morning was concluded by Urban Schnell from Helbling Technik AG, who reported about the development of a handheld pocket autorefractor, but as a representative of an industrial company included some exciting side-aspects of economy and social skills.

A lively discussion continued throughout lunch, an excellent buffet, which was kindly provided by the EPFL and SSOM. In the lunch area members of the Biomedical Photonics Network and PhD students involved in the EPFL Doctoral Program in Photonics presented their work in form of posters and many ideas were exchanged and fruitful interactions took place.

In the afternoon Raphaël Butté from the EPFL provided insights into the technology of wide band-gap semiconductor laserdiodes, which have a tremendous range of wavelengths. Rainer Leitgeb from the EPFL returned the subject to biomedical photonics by showing a visually stimulating excursion into the advances in optical coherence microscopy, where the focus moves from the investigation of biological structures to their functions. Michael Kempe from the Carl Zeiss Research Center concluded the day with an excellent overview of new directions in microscopic biomedical imaging.

The stimulating discussions and dialogues reflected the interest in each others research and thus one of our goals, to create new personal contacts was achieved. Once more we are happy that - thanks to all the participants - we had another fruitful and enjoyable day.

Martin Wolf

Participants are engaged in lively discussion at the poster ….

… and during lunch.

Veranstaltung	**Ort**	**Datum**	**Bemerkungen**
SSOM Vorstandssitzung	Bern	17. Januar 2007	
SAOG/GSSI Meeting	Fribourg	26. Januar 2007	Controlled Growth of Surface Nano Structures
Sektion Nano	Brugg-Windisch	25. or 31. January 2007	Preliminary announcement : 14 h – 17h at INKAFHNW
12th SSOM Engelberg Lectures	Engelberg	5. – 7. März	Photonics in Space
SSOM Mitgliederver-sammlung	Basel	evtl. 14. Sept. im Rahmen der Euler-Veranstaltung	Mit Industriepreisen und SSOM-Preis
SC NAT	Basel	13./14. September	187. Jahreskongress / Congrès annuel. Leonhard Eulers 300. Geburtstag
SATW			Jahreskongress

January

8 – 11	**Nanometa 2007 – 1st European Topical Meeting on Nanophotonics and Metamaterials** Seefeld, Austria

February

21 – 23	**Nanotech 2007 – Conference and Exhibition** Tokyo, Japan

March

5 – 7	**12th SSOM Engelberg Lectures** **"Photonics in Space"** - a challenge for modern technologies - Engelberg, Switzerland www.ssom.ch
27 – 29	**Nanotech Northern Europe 2007 (NTNE2007)** Helsinki, Finland

May

29 – 1 June	**TimeNav'07** Geneva International Conference Center - Switzerland www.timenav07.org

June

17 – 22	**EOS Conferences at the World of Photonics Congress 2007** Munich, Germany www.myeos.org/events.php

September

2 – 7	**Microscopy Conference MC2007 – 33. DGE Tagung** Saarbrücken, Universität des Saarlandes

See also according pages on ***www.ssom.ch***
www.nanoscience.ch/events.asp
www.ssom.ch/bmpn/activities.html
for further events .....

SSOM

Swiss Society for Optics and Microscopy

Société Suisse pour l'Optique et la Microscopie

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mit umseitigem Formular.

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