2 ANDO

Wednesday, 26.03.2008, Room 2140 (2nd floor)

Time	ID	ANDO 1: Optics and Spectroscopy, Physical Chemistry, Medicine *Chair: S. Alberti, CRPP-EPFL*
10:00		***Coffee Break***
10:30	**201**	**Broadband emitter based on a multiply RE-doped fibre** *Loredana Di Labio [1], Willy Lüthy [1], Valerio Romano [1], Frédéric Sandoz [2], Thomas Feurer [1],* *[1] Inst. of Appl. Phys. Univ. Bern, Sidlerstrasse 5, 3012 Bern* *[2] Silitec Fibers S.A., Route de la gare 70, 2017 Boudry* A fibre is manufactured with a 6.5 micrometers core doped with five different rare earths: Nd^{3+}, Ho^{3+}, Er^{3+}, Tm^{3+}, and Yb^{3+}. Co-doping with 7 at. % Al^{3+} leads to an index step Δn of 0.00344 at 804 nm corresponding to a numerical aperture NA of 0.1. Upon excitation with light of 804 nm wavelength, fluorescence of the five dopant ions occurs. Excited state absorption and / or energy transfer up-conversion lead to an extremely broad spectrum ranging from 365 nm up to 2300 nm. With a calibrated spectrometer the emitted power is measured. With an output power of 0.034 mW a radiance exceeding 3 kW sr^{-1} cm^{-2} is reached. The broad spectrum leads to a very short coherence length of 250 nm FWHM.
10:45	**202**	**Broadband emitters based on transition metal or metal-doped fibres** *Martin Neff, Valerio Romano, Willy Lüthy, Thomas Feurer* *Institute of Applied Physics, University of Bern, Sidlerstrasse 5, 3012 Bern* With the goal of finding strong broadband fluorescence we have drawn several optical silica fibres doped with V_2O_5, Cu_2O, Mn_2O and Bi_2O_3. The preforms for these fibres were all made with the technique of granulated oxides. All these metal ions incorporated in the silica host show a broad fluorescence in the visible range around 600 nm with a FWHM between 100 and 150 nm. Bi_2O_3 shows also a broad fluorescence band in the near infrared range at 1400 nm with a FWHM of about 200 nm. With the admixture of Al_2O_3, this fluorescence band can be shifted to 1150 nm.

11:00	~~**203**~~ **(&)** **cancelled**	~~**Time-resolved two photon photoemission study of hemicyanine dye self-assembled monolayer [pdf]**~~ ~~*Silvan Roth [1], A. Devizis [2], M. Hengsberger [1], O. Eicher-Lorka [3], Z. Kuodis [3], A. Matijoska [3], T. Greber [1], J. Osterwalder [1]*~~ ~~*[1] Physik-Institut der Universität Zürich, Winterthurerstr. 190, 8057 Zürich*~~ ~~*[2] Institute of Physics, Lithuania*~~ ~~*[3] Institute of Chemistry, Lithuania*~~ ~~Hemicyanine dyes are promising candidates for organic optoelectronic devices such as organic solar cells. 4-(4-dimethylamino)-styryl-1-(6-mercaptohexyl) pyridinium is a hemicyanine dye molecule which contains an electron acceptor pyridinium group as well as electron donor dimethylamino group. A great change of the molecule's dipole moment and formation of twisted internal charge transfer (TICT) state has been observed under optical excitation in solutions. Self assembling monolayers of these molecules can be grown on noble metal surfaces such as Ag or Au. We investigated charge dynamics in this hemicyanine dye self-assembled monolayer on crystalline a Ag(111) surface by means of two color time-resolved two photon photoemission. We attribute the observed time dependent shift of the work function to the molecule's dipole moment change under laser excitation. The relevant time scales for excitation and decay will be discussed.~~
11:15	**204**	**Ultrafast structural dynamics of graphite** *Fabrizio Carbone, Caltech, California Blvd, 91125 Pasadena, United States* By means of time-resolved electron crystallography, we report direct observation of the structural dynamics of graphite, providing new insights into the processes involving coherent lattice motions and ultrafast graphene ablation. When graphite is excited by an ultrashort laser pulse, the excited carriers reach their equilibrium in less then one picosecond by transferring heat to a subset of Strongly Coupled Optical Phonons (SCOP). The time resolved diffraction data show that on such time scale period the crystal undergoes a contraction whose velocity depends on the excitation fluence. The contraction is followed by a large expansion which, at sufficiently high power, leads to the ablation of entire graphene layers, as recently predicted theoretically.
11:30	**205**	**Principles of operation of a DNP prepolarizer coupled to a rodent MRI scanner** *Sami Jannin [1], Fiodar Kurdzesau [1], Arnaud Comment [1], Jacques Van der Klink [1], W. Th. Wenckebach [1], Ben van den Brandt [2], Patrick Hautle [2], Ton Konter [2], Rolf Grütter [3],* *[1] EPFL SB IPN LPMN, PH H0 514 (Bâtiment PH), Station 3, 1015 Lausanne* *[2] Sample Environment and Polarised Targets, PSI, 5232 Villigen* *[3] EPFL SB IPMC LIFMET, CH F0 632 (Bâtiment CH), Station 6, 1015 Lausanne* Because it is a non-invasive versatile technique, MR has become an essential tool in biomedicine. In particular, ^{13}C-label MRS experiments are widely used to investigate brain metabolism in vivo. However, the intrinsic low sensitivity of the technique limits the study to highly concentrated chemicals. Hyperpolarization by means of Dynamic Nuclear Polarization (DNP) provides a way to increase the signal of tracers by several thousand-fold. For instance, the infusion of

		DNP-enhanced labeled molecules allows for the measurement of low ^{13}C concentration in tissues. We describe here a 3.35 T DNP / 9.4 T MRI installation based on a continuous-flow cryostat, using a standard wide-bore low-field NMR magnet as prepolarizern magnet and a widely available radical as polarizing agent. An overview of the main hardware components is given. The full procedure starting from sample preparation and solid-state polarization to in vivo infusion is described.
11:45	**206**	**Mass detection on mammograms: variable signals and related performance changes for human and model observers [pdf]** *Cyril Castella [1,5], Karen Kinkel [2], Miguel P. Eckstein [3], Craig K. Abbey [3], Francis R. Verdun [1], Robert S. Saunders [4], Ehsan Samei [4], François O. Bochud [1]* *[1] Institut Universitaire de Radiophysique Appliquée, Grand-Pré 1, 1007 Lausanne* *[2] Clinique des Grangettes, Chemin des Grangettes, 1224 Chêne-Bougeries* *[3] University of California, UCSB, 931069660 Santa Barbara, United States* *[4] Duke University, 27705 Durham, United States* *[5] EPFL* This study presents the influence of signal variability on human and model observer performances for a detection task in mammography. We used synthetic but realistic masses, and real and synthetic (CLB) backgrounds. Five non-physician observers were asked to detect benign and malignant masses superimposed on real mammographic backgrounds or CLB. Results under the signal-known-exactly (SKE) paradigm were compared with signal-known-statistically (SKS) experiments. Model observers (channelized Hotelling observers) were implemented and compared to human observers' results in the same experimental conditions. We found that human observers' performances do not differ significantly when the masses are superimposed on real images or on CLB with matched grey level mean and standard deviation. The performance does not differ between SKE and SKS experiments using constant signal size, but drops when the latter varies during the experiment. Moreover, models can be adjusted to accurately predict all human SKE and SKS results.
12:00		***Postersession, Lunch***
12:45		***SPS GENERAL ASSEMBLY***

Thursday, 27.03.2008, Room 2193 (2nd floor)

Time	ID	Plenary Session and SPS Award Ceremony
08:30		***Plenary Session***
10:00		***Coffee Break***
10:30		***Plenary Session continued***
11:15		***SPS AWARD CEREMONY***
11:45		***Plenary Session continued***
12:30		***Postersession, Lunchbuffet***
		ANDO 2: Other Domains *Chair: A. Pochelon, CRPP-EPFL*
14:15	**211**	**Local deformation estimation in Sinogram space** *René Mooser [1], Peter Wyss [1], Gábor Székely [2], Urs Sennhauser [1]* *[1] Electronics/Metrology Lab., EMPA, Überlandstrasse 129, 8600 Dübendorf* *[2] Medical Image Analysis and Visualization Group, Computer Vision Laboratory, ETH Zürich, Sternwartstrasse 7, 8092 Zürich* Computed Tomography (CT) is a tool widely recognized and used for various applications in material science and medicine. It is often of great interest to examine the behaviour of some specific material under load, e.g. the local deformation of wood in compression. Instead of calculating the deformation from the reconstructed data, we propose to find the local deformations of a sample directly in the so called sinogram space, i.e. in the set of projections acquired for a large amount of different viewing angles. It is therefore possible to avoid the computationally expensive image reconstruction needed in currently used methods. Our approach is divided in two main steps. First, we perform deformation estimation in the sinogram and then use the data in a robust statistical procedure to extract the deformation parameters in the spatial domain.
14:30	**212**	**A thermal driven Faraday disc generator** *Claudio Palmy, Alpine Institute of Physics Stuls, APHIS, 7482 Stugl/Stuls* A magnetic disc, 45mm in diameter and 4mm thick, is mounted on a horizontal shaft and levitated vertically by fixed magnets. At one end of the shaft, a point bearing supports the disc magnet in a floating and stabilised position. The vertically floating magnet will, when locally heated at the upper surface, spontaneously oscillate with increasing amplitude. Continued heating leads to rotation that continues with heating. A soft copper wire that rubs gently on the outer edge of the disc is connected via a voltmeter to the point-bearing shaft. An induced voltage around 200 μV is observed. A physical model based on pendulum motion with mathematical analysis explains these motions [1]. [1] C. Palmy, Eur. J. Phys. 27, 1289-1297 (2006)

14:45	**213**	**^{59}Co nuclear magnetic resonance of nanostructures** *Aurore Rudolf [1], Mohamed Abid [2], Sima Valizadeh [3], Antonio Domingues dos Santos [4], Jacques van der Klink [1], Jean-Philippe Ansermet [1]* *[1] EPFL/SB/IPN/LPMN, PHB-Ecublens, station 3, 1015 Lausanne* *[2] 2CRANN and School of Physics, Trinity College, 2000 Dublin 2, Ireland* *[3] The Ångström laboratory, Solid State Physics, Box 534, S-75121 Uppsala* *[4] Laboratório de Materiais Magnéticos - DFMT Instituto de Física, Universidade de São Paulo, 66318 São Paulo, Brazil* The magnetoresistive systems are known to be of great interest because of their wide potential applications in spintronics. We use ^{59}Co zero-field nuclear magnetic resonance (NMR) as a first characterization in a study of the spin polarization of conduction electrons in magnetic nanostructures. In our NMR experiment, we expect the spin accumulation process to affect the NMR line shape when an electrical current is applied through the ferromagnetic (FM)/ non-magnetic (NM) interfaces. Here we present ^{59}Co NMR results obtained on two different types of materials presenting giant magnetoresistance: multi-layered systems containing alternate FM/NM metal layers and granular thin films containing magnetic impurities (clusters or nanoparticles) in a diamagnetic matrix. To be able to interpret the effect of an applied current on the ^{59}Co NMR signal, the Co layer should have a cubic face centred structure (fcc), as the bulk fcc peak is very narrow, i.e., its full width at half maximum (FWHM) is 2 MHz. In search for the best candidate we analysed Co/Au, Co/Ag and Co/Cu multilayered nanowires. The width of the NMR line in these materials may be too large (varying from 13MHz to several tens of MHz) to make them good candidates for our experiment. However the Co-NMR spectra present surprisingly different features depending whether Ag, Au or Cu is used for the spacer. This indicates structural differences of the Co-spacer interface. Additionally, we investigated granular thin films containing 59Co nanoparticles embedded in a copper matrix. Very short pulses (180ns) allow us to excite the entire linewidth. The NMR spectrum revealed a very narrow line for a ferromagnet and only the face centered cubic (fcc) phase was present with an FWHM of 0.7 MHz which is very promising. The system was also characterized by T_1 and T_2 relaxation times, determined at 300K, 150K and 80K.
15:00	**214**	**Investigation of opinion poll data and election results in Germany and Great Britain** *Johannes Josef Schneider, Institute of Physics, Johannes Gutenberg University of Mainz, Staudinger Weg 7, DE-55099 Mainz* *Christian Hirtreiter, Faculty of Chemistry, University of Regensburg, Universitätsstr. 31, DE-93053 Regensburg* Since many years, the Allensbach institute in Germany and a related institute in Great Britain performs an opinion poll each week, asking at least 1000 people the question "Which party would you vote for if there was an election next Sunday?" We investigate these opinion poll data by means of time series analysis. The most prominent results for the German data are fat tails in the return distributions of the time series. Furthermore, we find that the election results for the Green party cannot be predicted at all by opinion polls, for the conservative and the

		social democratic party, we find that the opinion poll data agree the more with the election results, the closer the date of the opinion poll is to the election date [1]. Thus, the question arises whether an opinion poll long before an election provides any useful information at all. In this talk, we compare the results we found in Germany with corresponding data from Great Britain. [1] J.J. Schneider and Ch. Hirtreiter, preprint, accepted for publication in Int. J. Mod. Phys. C, 2007.
15:15		
15:30		***Coffee Break***
		ANDO 3: Thin Films, Materials, Molecular Physics *Chair: Y. Martin, CRPP-EPFL*
16:00	**221**	**Frustration in dipolar coupled nanoscale ferromagnetic elements** *Elena Mengotti [1], Laura Heyderman [1], Arantxa Fraile-Rodriguez [2], Frithjof Nolting [2], Hans Benjamin Braun [3], Del Atkinson [4]* *[1] Paul Scherrer Institut, LMN, 5232 Villigen* *[2] Paul Scherrer Institut, SLS, 5232 Villigen* *[3] School of Physics; UCD , Belfield, 4000 Dublin, Ireland* *[4] Department of Physics, University of Durham, South Road, Durham, DH1 3LE, United Kingdom* There are several physical systems, such as liquid crystals, diblock copolymers and protein folding, where frustration plays an important role. The frustration occurs because not all interactions in the system can be satisfied and one classical example of geometrical frustration in nature is ordinary water ice where the hydrogen atoms follow the "so-called" ice rules. We have directly observed the effects of frustration and disorder in dipolar coupled nanoscale ferromagnetic elements arranged in suitable two-dimensional geometries. This was made possible by combining the latest lithography methods to fabricate nanopatterned magnetic thin films and the use of photoemission electron microscopy. We present the fabrication process, the imaging technique with magnetic contrast as well as the first promising results together with calculations of the different possible configurations.
16:15	**222**	**Quantum efficiency measurement of n-i-p a-Si:H photodiode array on CMOS circuit for Positron Emission Tomography (PET)** *Alessandro Nardulli, Günther Dissertori, Werner Lustermann, Dietrich Schinzel, ETH IPP Zürich, Schafmattstrasse 20, 8093 Zürich* Detection of scintillation light from LSO crystals used in Positron Emission Tomography (PET) is traditionally based on photomultipliers. The proposal is to develop a novel photo-sensor, which is based on vertically integrating an amorphous silicon n-i-p photodiode on a pixel readout chip. This is achieved by the deposition of a hydrogenated amorphous silicon (a-Si:H) film on top of a VLSI (Very Large Scale of Integration) chip that performs both signal amplification and readout processing before retrieving the signal from the chip. The advantage of such an approach is the extremely compact and low-cost design, together with very fast and ultra-low noise signal retrieval.

		This talk will concentrate on: 1) The measurement of the Quantum Efficiency at 420 nm for samples deposited on glass and on integrated circuit. 2) Measurement of the uniformity of the deposited amorphous silicon. 3) Some electronic design choices for the low noise preamplifier design.
16:30	**223**	**Influence of pressure on microcrystalline silicon material quality and solar cell performance** *Gregory Bugnon, Andrea Feltrin, Fanny Sculati-Meillaud, Christophe Ballif, Institut de Microtechnique de Neuchâtel, Rue A.-L.Breguet 2, 2000 Neuchâtel* Recently, microcrystalline silicon (µc-Si:H) has attracted a lot of interest, because solar module efficiencies are significantly enhanced in tandem configurations with amorphous silicon as top cell. Despite the strong potential for industrial applications, the conditions favoring good material qualities have yet to be fully understood. µc-Si:H growth with VHF-PECVD was examined in a parallel plate KAI-S reactor. The influence of pressure on material quality was studied in single junction solar cells were prepared. Solar cells at increasingly higher pressures exhibit remarkable improvements. Further analyses showed that µc-Si:H intrinsic layers grown at higher pressures have significantly lower defect densities. These results are attributed to lower ion bombardment energies due to higher pressures, which improves the microcrystalline material quality. In fact, layer amorphization is observed at low pressure. Calculations show that the average ion energy drops from roughly 20 eV to a few eV in the pressure range studied.
16:45	**224**	**Electro-optically Active Integrated Photonic Devices in $LiNbO_3$ Thin Films** *Manuel Koechlin, Frederik Sulser, Gorazd Poberaj, Peter Günter, Inst. for Quantum Electronics, ETH Zürich, Wolfgang-Pauli-Str. 16, 8093 Zürich* In the last years there was a growing interest in highly integrated photonic devices, which have the potential to replace electronic circuits for optical signal processing applications. Our recently developed crystal ion slicing and wafer bonding technique to obtain single-crystalline submicrometer-thick lithium niobate ($LiNbO_3$) films offers the possibility to realize such devices with a high index contrast and a strong electro-optical response. For patterning a laser-lithography setup has been built in our lab, which includes an acousto-optic deflector allowing very flexible and more precise structuring than standard mask-lithography. Based on this approach we will present the fabrication and performance of laterally coupled electro-optically tunable microring resonators in $LiNbO_3$.
17:00	**225**	**Spatial evolution of oxygen vacancies in Cr-doped $SrTiO_3$ during the insulator-to-metal transition in electric fields** *Pererik Andreasson, Markus Janousch, Urs Staub* *Swiss Light Source, Paul Scherrer Institut, 5232 Villigen* ***Abstract see Poster 103.***
17:15		***END***

ID	ANDO Poster
231	**Feasibility of high repetition rate picosecond X-ray absorption experiments at Synchrotrons** *Frederico Lima [1,2], Christopher Milne [2], Frank van Mourik [1], Renske van der Veen [1,2], Van Thai Pham [1],Amal El Nahhas [1], Steven Johnson [2], Paul Beaud [2], Daniel Grolimund [2], Rafael Abela [2], Gerhard Ingold [2], Christian Bressler [1], Majed Chergui [1]* *[1] EPFL SB ISIC LSU, 1015 Lausanne* *[2] Paul Scherrer Institut, Swiss Light Source, 5232 Villigen PSI* X-ray Absorption Fine Structure Spectroscopy (XAFS) is an established tool for measuring local molecular structures. Combining the atomic selectivity of X-rays with pulsed synchrotron radiation (SR) time resolved XAFS delivers structural information from ca. 50 ps to several hundred nanoseconds (and beyond). Up to now, laser-X-ray pump-probe experiments at synchrotrons exploited 1 kHz amplified laser pulses, which is considerably lower than the multi-MHz SR repetition rates. The use of a multi-kHz laser will increase the integrated probe flux, and may allow to study time-resolved XAFS on very dilute samples. Thus the time-dependent behavior of biological systems in physiological media may become observable this way. One goal of this project is the study of the dynamics of metalloproteins, e.g., heme proteins, using picosecond XAFS methods. A case study using the spin-crossover $[Fe\{II\}(bpy)_3]^{2+}$ complex, including all the relevant experimental parameters will be presented. Different detection schemes, data collection and storage strategies will be discussed. The potential and limitations of picosecond XAFS at multi-kHz repetition rates at synchrotrons are discussed.
232	**Fast Detection of Telecom Photons with Superconducting Single-Photon Detectors** *Noé Curtz [1,2], Edmond Koller [1], Hugo Zbinden [2]* *[1] Univ. Genève, DPMC Quai E. Ansermet 24, 1211 Genève* *[2] Univ. Genève, GAP-Optique, Rue de l'Ecole-de-Médecine 20, 1211 Genève* Superconducting Single-Photon Detectors (SSPDs) are a type of device combining ultimate sensitivity (single-photon) with a good quantum efficiency and very high speed counting rates (>GHz) at telecom wavelengths. These properties make them an excellent candidate for single-photon communications and applications such as quantum cryptography. We present the performances of the state-of-the-art SSPDs as well as our investigations toward developing high-T_c superconducting