# KOND

## *Tuesday, 01.07.2014, Room G 140*

| Time | ID | KOND<br>*Chair: Christian Rüegg, PSI Villigen & Uni Genève* |
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| 14:00 | 22 | ***Winner of the SPS IBM Award (i)*** |
| 14:30 | 23 | ***Winner of the SPS OC Oerlikon Award (i)*** |
| 15:00 | 24 | ***Winner of the SPS METAS Award (i)*** |
| 15:30 | 201 | **The role of space charge in spin-resolved photoemission experiments**<br><br>*Gerard Salvatella Orgillés [1], Andreas Fognini [1], Thomas Michlmayr [1], C. Wetli [1], U. Ramsperger [1], T. Bähler [1], F. Sorgenfrei [2], M. Beye [2], A. Eschenlohr [2], N. Pontius [2], C. Stamm [2], F. Hieke [3], M. DellAngela [3], R. Kukreja [3], S. de Jong [3,6], N. Gerasimova [4], V. Rybnikov [4], H. Redlin [4], J. Raabe [5], A. Foehlisch [2], H. A. Dürr [6], W. Wurth [3], Danilo Pescia [1], Andreas Vaterlaus [1], Yves Acremann [1]*<br>*[1] Laboratory for Solid State Physics, ETH Zürich, Otto-Stern Weg 1, 8093 Zürich*<br>*[2] Institut für Methoden und Instrumentierung der Forschung mit Synchrotronstrahlung, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, DE-12489 Berlin*<br>*[3] Institut für Experimentalphysik and Center for Free-Electron Laser Science, Universität Hamburg, DE-22607 Hamburg*<br>*[4] DESY, Notkestraße 85, DE-22607 Hamburg*<br>*[5] Paul Scherrer Institute, 5232 Villigen PSI*<br>*[6] SLAC National Accelerator Laboratory, Menlo Park, 94025 CA, USA*<br><br>If a ferromagnet is exposed to an ultrafast laser pulse its apparent magnetization is reduced within less than a picosecond. Most detection schemes for the magnetization focus on electrons close to the Fermi energy or probe the density of empty states. The total magnetization, i.e., the average spin polarization of the whole valence band, was not detectable up to now on a sub-picosecond time scale. We present Experimental data from free electron laser-based spin resolved photoemission, detecting electrons from the entire valence band. This experiment confirms ultrafast demagnetization within less than 100 fs. |
| 15:45 | 202 | **Ultrafast recovery of a charge density wave due to electron-hole scattering**<br><br>*Claude Monney [1], Christopher Nicholson [1], Michele Puppin [1], Ralph Ernstorfer [1], Martin Wolf [1], Arnaud Magrez [2], Cephise Cacho [3], Moritz Hoesch [4]*<br>*[1] Fritz-Haber-Institut, Max Planck Gesellschaft, Faradayweg 4-6, DE-14195 Berlin*<br>*[2] Institute of Condensed Matter Physics, EPFL, 1015 Lausanne*<br>*[3] Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell Campus, Didcot, UK*<br>*[4] Diamond Light Source, Harwell Campus, Didcot, UK*<br><br>We present a time- and angle-resolved photoemission spectroscopy study of the charge density wave (CDW) phase of $TiSe_2$. Photoinduced melting of the CDW phase occurs on an ultrafast time scale, shorter than 200 fs [1]. A detailed analysis of the recovery of this phase after its melting shows that it consists of a slow and a fast component. The fast component, which has a relaxation time of about 100 fs, is identified as the signature of strong electron-hole scattering, specific to the semi-metallic band structure of $TiSe_2$ [2]. We conclude that this electron-hole scattering drives the electronic instability leading to the CDW phase transition in $TiSe_2$.<br><br>[1] T. Rohwer et al., Nature 471, 490 (2011).<br>[2] C. Monney, G. Monney, P. Aebi and H. Beck, Phys. Rev. B 85, 235150 (2012). |

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| **16:00** | **203** | **A New Phase Multiplexing Technique to speed up Magnetic Resonance Force Microscopy**<br><br>*Alexander Eichler, Brad Moores, Christian Degen*<br>*Department of Physics, ETH Zürich, Otto-Stern-Weg 1, 8093 Zürich*<br><br>Magnetic resonance force microscopy (MRFM) is a scanning microscopy technique that enables the measurement of nuclear spin densities with a spatial resolution of a few nanometers. It is similar to standard NMR in that it is isotope selective, which means that different contrasts can be obtained for spins of different elements. Usually, the time required to map a single element is on the order of two weeks, and different elements have to be measured sequentially. Here, we present a new method that allows us to map several elements in parallel using a phase multiplexing technique. Our technique has the potential to radically speed up future MRFM experiments. |
| **16:15** | **204** | **Disentanglement of pseudogap and charge stripe order in Nd-LSCO**<br><br>*Christian E. Matt [2], Johan Chang [1], Claudia G. Fatuzzo [1], Yasmine Sassa [3], Martin Månsson [4], Sara Fatale [1], Valerio Bitetta [1], Xun Shi [2], Stephane Pailhès [5], Magnus Berntsen [6], Tohru Kurosawa [7], Migaku Oda [7], Masayuki Ido [7], Naoki Momono [7], Jiaqiang Yan [8], Jianshi Zhou [9], John B. Goodenough [9], Ming Shi [2], Luc Patthey [2], Nicholas Plumb [2], Milan Radovic [2], Marco Grioni [1], Joël Mésot [4], Oscar Tjernberg [6]*<br>*[1] LQM, Institute for Condensed Matter Physics, EPFL, Station 3, 1015 Lausanne*<br>*[2] Swiss Light Source, Paul Scherrer Institut, 5232 Villigen PSI*<br>*[3] Laboratory for Solid State Physics, ETH Zürich, 8093 Zürich*<br>*[4] Laboratory for Neutron Scattering, Paul Scherrer Institut, 5232 Villigen PSI*<br>*[5] Institut Lumière Matière, Université de Lyon 1, FR-69622 Villeurbanne CEDEX*<br>*[6] Materials Physics, KTH Royal Institute of Technology, SE-100 44 Stockholm*<br>*[7] Department of Physics, Hokkaido University, Sapporo 060-0810, Japan*<br>*[8] Materials Science and Engineering, University of Tennessee, Knoxville, Tennessee 37996-2100, USA*<br>*[9] Dept of Mechanical Engineering, University of Texas at Austin, Austin, Texas 78712-1591, USA*<br><br>Despite relentless efforts,the pseudogap phase of cuprates and its possible relation to high-temperature superconductivity remain enigmatic [1]. Even more complexity has been added by the experimental discovery of charge order [2], recently demonstrated as a universal property of underdoped cuprates [3]. Naturally, this raised the question as to whether the pseudogap is a precursor to charge order? This presentation addresses exactly that issue by means of angle resolved photoemission spectroscopy. Disentanglement of the spectroscopic signatures from pseudogap physics and charge ordering made it possible to show the different nature of these two phases.<br><br>[1] M. R. Norman et al., Adv. Phys. 54, 715-733 (2005)<br>[2] J. M. Tranquada et al., Nature 375, 561 - 563 (1995)<br>[3] T. Wu et al., Nature 477, 191-194(2011) |
| **16:30** | | ***Coffee Break*** |

| ID | KOND Poster |
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| **221** | **Measuring the dielectric constants of metals in the liquid state by high-temperature ellipsometry**<br><br>*Patrick Schwaller, Sarah Zehnder, Marc Schmid, Beat Neuenschwander*<br>*Institute for Applied Laser, Photonics and Surface Technologies, BFH, Pestalozzistrasse 20, 3400 Burgdorf*<br><br>Laser-cutting is today widely used in industrial applications. To improve the cutting performance, e.g. the quality of the cutting edge, it is necessary to understand the interaction between the laser light and the material to be cut at the cutting front. Because at the cutting front the material is in the liquid state, the interaction is dependent on the complex dielectric constant in the liquid state. To asses this information a custom-made ellipsometer for temperatures up to 2000 K has been built. Results of measurements for Ag, Au and Co in the solid and liquid state will be presented and discussed. |

**222** **Effects of heat current on magnetization dynamics in ferromagnetic insulator**

*Francesco Antonio Vetrò, EPFL SB ICMP LPMN PH H0515, 1015 Lausanne*

The work presented here is aimed at investigating the interplay between spin dynamics and heat currents in single-crystal Yttrium Iron Garnet. The irreversible thermodynamics for a continuous medium predicts that a thermal gradient, in the presence of magnetization waves, produces a magnetic induction field, thus a magnetic analog of the well-known Seebeck effect. Time-resolved transmission measurements of magnetizations waves propagating along the thermal gradient of a thin slab of YIG crystal provided an experimental observation of this Magnetic Seebeck effect. YIG disk subjected to a temperature gradient were also studied to characterise further this effect.

**223** **The influence of the lattice and electron gas temperature on ultrafast demagnetization**

*Rafael Gort, Yves Acremann, Andreas Fognini, Gerard Salvatella, Thomas Michlmayr, Andreas Vaterlaus, Laboratory for Solid State Physics, ETH, Otto-Stern-Weg 1, 8093 Zürich*

The mechanism for ultrafast demagnetization is still under debate. One approach is based on Elliot Yafet scattering on phonons. An alternative approach has been developed by Battiato considering transport of spin angular momentum from the ferromagnet into the substrate. Here, we present an experiment where ultrafast demagnetization is measured depending on the electron gas and lattice temperature. A first pump pulse excites the electron gas. A second pump pulse induces ultrafast demagnetization while excitations from the first pulse are present. Our results indicate, that the presence of phonons leads to longer demagnetization times, favoring the transport model.

**224** ***g1* of Polydisperse Spheres at Random Close Packing**

*Chi Zhang [1], Matthias Möbius [2], Frank Scheffold [1]*
*[1] University of Fribourg, Chemin du Musée, 3, 1700 Fribourg*
*[2] Trinity College Dublin, College Green, Dublin, Ireland*

In this poster, we will discuss the first peak intensity, *g1*, of the pair correlation function of polydisperse sphere particles at random close packing (RCP). We will esteblish a theory to calculate *g1* based on the particle size distribution *p* and the surface to surface separation $G_s$. Then we will present the simulation results of the 'modified' granocentric model. The theory prediction is in excellent agreement with the simulation of the model, the simulated packings, as well as the experimental data of the emulsions.