Welcome to Santa Fe and the 2010 International Conference on Strongly Correlated Electron Systems. For those of you who came to the 1989 International Conference on the Physics of Highly Correlated Electron systems, welcome back. For others, this may be your first visit to the Southwest or to a SCES conference. We hope you enjoy both just as much as we enjoy having you here.

SCES 2010 follows the tradition of earlier conferences, in this century being hosted by Buzios (’08), Houston (’07), Vienna (’05), Karlsruhe (’04), Krakow (’02) and Ann Arbor (’01). Every three years since 1997, SCES has joined the International Conference on Magnetism (ICM), held in Recife (’00), Rome (’03), Kyoto (’06) and Karlsruhe (’09). Like its predecessors, SCES 2010 topics include strongly correlated f- and d-electron systems, heavy fermion behaviors, quantum phase transitions, non-Fermi liquid phenomena, unconventional superconductivity, and emergent states that arise from electronic correlations. Recent developments from studies of quantum magnetism and cold atoms complement the traditional subjects and are included in SCES 2010.

This conference would not be possible without the hard work of the SCES 2010 Program Committee, International and National Advisory Committees, Local Committee and conference organizers, the New Mexico Consortium. We thank them as well as those organizations that generously provided financial support: ICAM-I2CAM, Quantum Design, Lakeshore, the National High Magnetic Field Laboratory and the Department of Energy National Laboratories at Argonne, Berkeley, Brookhaven, Los Alamos and Oak Ridge. Of course, we especially thank you for bringing new ideas and new results, without which SCES 2010 could not be possible.

2010 celebrates the 400th anniversary of Santa Fe as well as the birth of astronomy. So what’s the connection to SCES? The Dutch invention of the first practical telescope and its use by Galileo in 1610 and subsequent years overturned dogma that the sun revolved about the earth. This revolutionary, and at the time heretical, conclusion required innovative combinations of new instrumentation, observation and mathematics. These same combinations are just as important 400 years later and are the foundation of scientific discoveries that will be discussed during SCES 2010. As we will learn, past dogmas about strongly correlated materials and phenomena must be re-examined with an open and inquisitive mind. Hopefully, Santa Fe and this conference will offer an environment that allows the open discussion, as well as debate, that is necessary to keep this challenging and exciting scientific field so vibrant.

We join you in looking forward to an enjoyable and stimulating SCES 2010.

John L. Sarrao
Joe D. Thompson
SCES 2010 Co-chairs

Invited Speakers

D. Agterberg (Milwaukee)
D. Basov (La Jolla)
C. Batista (Los Alamos)
E. Bauer (Vienna)
K. Behnia (Paris)
A. Bianchi (Montreal)
S. Borisenko (Dresden)
P. Coleman (Piscataway)
J. Davis (Ithaca)
A. deVisser (Amsterdam)
J. Flouquet (Grenoble)
S. Friedemann (Dresden)
J. Grin (Dresden)
Y. Haga (Tokai)
H. Harima (Kobe)
R. Hulet (Houston)
R. Kato (Saitama)
M. Kenzelmann (Villigen)
B. Kim (Ann Arbor)
Y. Kitaoka (Osaka)
C. Kollath (Saclay)
J. Lawrence (Irvine)
H. Liu (Cambridge, US)
A Mackenzie (St. Andrews)
Y. Matsuda (Kyoto)
R. McQueeney (Ames)
K. Miyake (Osaka)
S. Nakatsuji (Tokyo)
M. Norman (Argonne)
P. Pagliuso (Campinas)
T. Park (Suwon)
S. Paschen (Vienna)
T. Pruschke (Goettingen)
E. Sampathkumaran (Mumbai)
D. Scalapino (Santa Barbara)
S. Sebastian (Cambridge)
A. Sefat (Oak Ridge)
P. Sengupta (Singapore)
O. Stockert (Dresden)
H. Takagi (Tokyo)
C. Varma (Riverside)
H. vonLohneysen (Karlsruhe)
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Venue
All oral and poster sessions of SCES 2010 will be held in the Sweeney Convention Center which has wireless internet throughout the building. The welcoming reception on Sunday evening and the conference banquet on Wednesday evening also will be held at the Convention Center.

Social program
Excursions to Bandelier, Puye Cliffs or Los Alamos will depart promptly from the Convention Center on Wednesday at 13:00 and will return to the Convention Center at 17:30. If you have not indicated already a desire to go on one of the trips, please contact someone at the registration desk as soon as possible because space is limited. In addition to the excursion, there is a companion's program that plans several activities in and around Santa Fe. If your companion is interested in participating in some of these activities, please visit the companion's program desk in the Convention Center lobby.

A word of caution--at the altitude of Santa Fe (about 2200 m), the rather intense sunlight and low humidity can cause sunburns and dehydration. When you're out and about, it is good to apply a sun screen lotion and to drink water frequently.

Presentations
Posters should be designed to fit in an area 46-inches (117-cm) wide by 36-inches (92-cm) high. Please set up your poster after 8:00 and before 12:00 noon on your assigned day. Velcro strips will be provided at each poster board to attach your poster. (Pins or sticky tape must not be used.) Please take down your poster by 17:00 on the day of your presentation; otherwise, it will removed and discarded.

Oral presentations consist of plenary, invited and oral contributed talks. Please respect your allotted time so that sessions can remain on schedule. To avoid intruding on your speaking time or that of the person who follows you, all talks will be installed on a common PC computer at least 10 minutes before the start of a session. An Apple computer will NOT be available for this purpose. Please provide your electronic presentation on a USB memory stick to the computer operator well before the start of your session. A laser pointer will be available in each of the session rooms.

A side room will be available for practicing your talk using your own computer and ensuring compatibility of content.

Proceedings
All registered participants are invited to submit a conference proceedings paper. Accepted manuscripts based on poster presentations will be published in the Journal of Physics: Conference Series. The deadline for contributed manuscripts has past. Please submit your manuscript as soon as possible, if you have not done so already. Oral presentations (and a selected subset of contributed papers) will be invited to submit a manuscript to a 'topical special issue' of the Journal of Physics: Condensed Matter. The combined proceedings will be published jointly by Institute of Physics.

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P1: Quantum criticality (Sweeney F)

Monday, 8:30-10:10

Mapping the effect of frustration on the Kondo lattice

Piers Coleman and Andriy Nevidomskyy, Rutgers University

A spate of new discoveries in heavy electron physics indicating the departure from Fermi liquid behavior over a finite range of magnetic field or pressure in YbAgGe [1], $YbAlB_4$ [2,3], $YbRh_2Si_{2-x}Ge_x$ [4] and $YbRh_{2-x}Ir_xSi_2$ [5] suggest the possible formation of "non-Fermi liquid phases" that form between the antiferromagnet and the heavy Fermion metal. These results suggest that the canonical "Doniach Phase Diagram" for heavy electron physics requires revision. I shall discuss how these new discoveries can be understood in terms of the interplay of zero-point magnetic fluctuations and the Kondo effect, leading to a new "two dimensional" Kondo lattice phase diagram.

[1] S. Budko, E. Morosan, and P. Canfield, Phys. Rev. B 69, 014415 (2004).
[2] S. Nakatsuji et al. Nature Phys.,4, 603, (2008).
[3] A. Nevidomskyy and P. Coleman, Phys. Rev. Lett. 102, 077202 (2009).
[4] J. Custers, C. Geibel, F. Steglich, P. Coleman and S. Paschen, submitted for publication (2009).
[5]S. Friedemann et al, Nature Phys. 5, 465 (2009).

Funding for this work provided by NSF DMR 0907179.

Tuning magnetic quantum phase transitions

Hilbert v. Löhneysen, Karlsruhe Institute of Technology (KIT), D-76128 Karlsruhe, Germany

In a number of strongly correlated metallic systems, long-range magnetic order can be tuned to zero temperature by an external parameter such as pressure, chemical composition, or magnetic field. Highly anisotropic magnetic fluctuations in the heavy-fermion system $CeCu_{6-x}Au_x$ are observed by inelastic neutron scattering when approaching the QPT at x = 0.1, despite the fact that long range-incommensurate order for x ³ 0.15 is three-dimensional. The QPT in this system can be tuned not only by Au concentration, but also by hydrostatic pressure or magnetic field, which offers the opportunity to elucidate the role of the tuning parameter. Tuning with Au concentration or hydrostatic pressure leads to surprisingly similar behavior of magnetic ordering wave vector, thermodynamics, and electronic transport close to the QPT. On the other hand, magnetic-field tuning leads to distinctly different behavior of critical fluctuations. We will compare the volume and magnetic Grüneisen parameters obtained from thermal expansion and magnetocaloric effect, respectively.

Bulk $LaCoO_3$ is in a low-spin S = 0 state for $T \rightarrow 0$, but tensile strain on epitaxial $LaCoO_3$ films exerted by the substrate induces ferromagnetism. Using different substrates to tune the lattice constant <a>, distinctly different dependencies of the Curie temperature and effective magnetic moment on <a> are obtained. The possibility of a QPT obtained by strain tuning in this system will be discussed.

Quantum criticality and collapsing Fermi surface in $YbRh_2Si_2$

Sven Friedemann, Steffen Wirth, Manuel Brando, and Tanja Westerkamp, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany, Philipp Gegenwart, I. Physik. Institut, Georg-August-Universität, Göttingen, Germany, Niels Oeschler, Cornelius Krellner, Germany Christoph Geibel, Frank Steglich, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany, Silke Paschen, Vienna University of Technology, Wien, Austria, Stefan Kirchner, Max-Planck-Institute for the Physics of Complex Systems, Dresden, Germany Qimiao Si, Department of Physics and Astronomy, Rice University, Houston, TX 77005, USA

Conventionally, a quantum critical point (QCP) is described within the quantum generalization of finite temperature phase transitions, the Ginzburg-Landau theory. Discrepancies of experimental observations in heavy-fermion metals with the predictions of this approach stimulated new unconventional scenarios which are based on the breakdown of the Kondo effect. Here, we present results on the prototypical material $YbRh_2Si_2$ for which the antiferromagnetic QCP is accessed by means of a small magnetic field. On the one hand, we report high-precision Hall-effect measurements establishing a jump of the Hall coefficient at the QCP thus reflecting the Fermi surface reconstruction arising from the breakdown of the Kondo effect. On the other hand, we present results revealing the global phase diagram of $YbRh_2Si_2$ under positive and negative chemical pressure as realized by Co and Ir substitution on the Rh side [1]. Surprisingly, chemical pressure leads to a detachment of the magnetic instability from the Fermi surface reconstruction. In particular, negative pressure induces a separation of the two with a spin-liquid type ground state emerging in the intermediate field range. These results indicate a new quantum phase arising from the interaction of the Kondo breakdown and the magnetic quantum phase transition.

[1] S. Friedemann et al, Nature Phys. 5, 465 (2009).

I1: URu_2Si_2 (Sweeney F)

Monday, 10:40-12:00

Imaging the Fano lattice to 'hidden order' transition in URu_2Si_2

J.C. Seamus Davis, A.R. Schmidt, and M. Hamidian, Cornell/BNL, G. Luke, J.D. Garrett, T.J. Williams, McMaster University, P. Wahl, MPI Stuttgart F. Meier, Hamburg, A.V. Balatsky, LANL

Within a Kondo lattice, the strong hybridization between electrons localized in real space (r-space) and those delocalized in momentum-space (k-space) generates exotic electronic states called 'heavy fermions'. In URu_2Si_2 these effects begin as expected at temperatures T~55K but are suddenly altered by an unidentified electronic phase transition at T_o=17.5 K. Whether this is conventional ordering of the k-space states, or a change in the hybridization of the r-space states at each U atom, is unknown. Here we use spectroscopic imaging scanning tunnelling microscopy (SI-STM) to image the evolution of URu_2Si_2 electronic structure simultaneously in r-space and k-space. Above T_o, the 'Fano lattice' electronic structure predicted for Kondo screening of a magnetic lattice is revealed. But below T_o, a partial energy-gap but without any associated density-wave signatures emerges from the Fano lattice. Heavy-quasiparticle interference imaging within this gap reveals its cause as the rapid splitting below T_o of a light k-space band into two new heavy fermion bands. Thus, the URu_2Si_2 'hidden order' state emerges directly from the Fano lattice electronic structure and exhibits characteristics, not of a conventional density wave, but of a sudden alteration in both the hybridization at each U atom its associated heavy fermion states.

Stealth coupling in URu_2Si_2

Hisatomo Harima, Kobe University

The origin of the second-order phase transition observed around 17.5 K in URu_2Si_2, has been investigated intensively for long time. There has not been any clear evidence for time reversal symmetry breaking or lattice distortion in the low-temperature ordered phase, and then the order parameter has not been established so far. Therefore, the order has been called "the hidden order". Very recently, it is proposed that the space group in the ordered phase is $P4_2/mnm$ (No. 136); one of the subgroup of I4/mmm (No. 139) in the high temperature phase [1]. The transition from No. 139 to No. 136 does not require any kind of lattice distortion and allows the NQR frequency at a Ru site unchanged, therefore it is easily understood that the conventional experimental techniques has been unable to detect the phase transition. The proposed space group is compatible with O_{xy}-type anti-ferro-quadrupole ordering with Q = (0, 0, 1). Such the anti-ferro-quadrupole coupling should be realized in the system, although good nesting property, as well known in skutterudites [2], could not be found in the Fermi surfaces. It should be emphasized that the coupling can survive any kinds of lattice distortions even in higher temperatures. The characteristic electronic structure of the hidden ordered phase will be discussed based on the local $5f^2$ electron picture.

[1] H. Harima, K. Miyake, J. Flouquet, J. Phys. Soc. Jpn. 79, 033705 (2010).

[2] H. Harima, J. Phys. Soc. Jpn. 77 Supplement A, 114 (2008).Funding for this work provided by a Grant-in-Aid for Scientific Research on Innovative Areas ‘‘Heavy Electron’’ (No. 20102002) from the Ministry of Education, Culture, Sports, Science and Technology, Japan.

Electronic structure theory of the hidden order material URu_2Si_2

Peter M. Oppeneer, Jan Rusz, Michi-To Suzuki, and Saad Elgazzar, Uppsala University, Sweden, John A. Mydosh, Leiden University, Netherlands

We have performed extensive electronic structure calculations of the paramagnetic (PM), large moment antiferromagnetic (LMAF), and hidden order (HO) phases of URu_2Si_2, using relativistic, full-potential LSDA, LSDA+U, and DMFT approaches. A detailed comparison of calculated and known experimental data shows that LSDA calculations, assuming delocalized uranium 5f states, provide an excellent explanation of the low-temperature LMAF and PM phases. This exemplified by calculated results for the equilibrium volume, Fermi surface (FS) gap, spin, orbital magnetic moments, de Haas-van Alphen frequencies, FS nesting vectors, resistivity, infrared optical spectra, compensated metal property and number of carriers. Temperature-dependent DMFT calculations performed for the PM high-temperature phase show progressive opening of a quasi-particle gap when temperature is reduced. The influence of long-lived longitudinal AF fluctuations is analyzed in detail. Although an AF mode would normally be only a very soft perturbation, the situation is different for URu_2Si_2. Due to the huge FS gap, coupling strongly to the AF mode a macroscopic gap is induced, which modifies the materials' bulk properties. This dynamical symmetry breaking explains why the gap in the HO is 70% of that of the LMAF phase and predicts that the dynamical spin-spin correlation should show typical order parameter behavior.

I2: Spin states (Sweeney A)

Monday, 10:40-12:00

Quantum spin liquid state in a dimer Mott system based on the $Pd(dmit)_2$ molecule

Reizo Kato, RIKEN

Conducting anion radical salts of $Pd(dmit)_2$ belong to a strongly correlated two-dimensional system with a quasi triangular lattice of $[Pd(dmit)_2]_2^-$ dimers. At ambient pressure, most of them are Mott insulators and spin-1/2 Heisenberg antiferromagnets where the spin frustration operates. Among them, the $EtMe_3Sb$ salt with a nearly regular-triangular lattice has been found in the quantum spin liquid state. ^{13}C-NMR indicates no spin ordering/freezing down to 19.4 mK. Since this temperature is smaller than 0.01 % of J, the absence of spin ordering/freezing is attributed to quantum fluctuations. The nuclear spin-lattice relaxation rate $1/T_1$ shows a kink around 1 K, and T^2-dependence below 1 K. This suggests a nodal spin gap. On the other hand, each of heat capacity and thermal conductivity shows a T-linear term in the zero-temperature limit, indicating the presence of gapless excitations. Magnetic-field dependence of the thermal conductivity, however, suggests excitation-gap formation at 1 K. All these results indicate unusual bipartite nature of elementary excitations in this quantum liquid.

This work has been done in collaboration with S. Yamashita, Y. Nakazawa (Osaka Univ.), T. Itou, M. Yamashita, and Y. Matsuda (Kyoto Univ.). This work was supported by Grants-in-Aid for Scientific Research (No. 20110003) from the Ministry of Education, Culture, Sports, Science and Technology, Japan.

Spontaneous quantum Hall effect in frustrated magnets

Ivar Martin and ***Cristian D. Batista***, LANL

We study the Kondo Lattice and Hubbard models on a triangular lattice for band filling factor n=3/4. We show that a simple non-coplanar chiral spin ordering (scalar spin chirality) is naturally realized in both models due to perfect nesting of the Fermi surface. The resulting triple-Q magnetic ordering is a natural counterpartof the collinear Neel ordering of the half-filled square lattice Hubbard model. We show that the obtained chiral phase exhibits a spontaneous quantum Hall-effect with $s_{xy}= e^2/h$.

Emergence of helimagnon bands in MnSi

Marc Janoschek, University of California, San Diego, Florian Bernlochner, Sarah Dunsiger , Christian Pfleiderer, and Peter Böni, Technische Universität München, Germany, Bertrand Roessli, Paul Scherrer Institut, Switzerland, Peter Link , FRM-II, Technische Universitaet München, Germany, Achim Rosch, Universität zu Köln, Germany

Recent theoretical studies [1,2] predict that the broken inversion symmetry in the helical phase of MnSi will lead to a rich spectrum of helimagnons for wave vectors that are small compared to the helical propagation vector k. However, for the large wave vector limit, corresponding to locally ferromagnetic magnetic moments, a nearly ferromagnetic dispersion was expected. Our extensive inelastic neutron scattering study in the helical phase shows the existence of broad dispersive excitations that contradicts this expected behavior. Using a parameter free model we quantitatively establish that these excitations represent broad spin wave bands that are purely caused by the tiny magnetic propagation vector [3]. The small magnetic Brillouin zone leads to multiple Umklapp interactions and thus many helimagnon modes. Our study provides a tractable showcase how collective spin excitations may be radically modified even in simple systems by seemingly harmless small magnetic propagation vectors.

[1] Belitz D., Kirkpatrick T. R. and Rosch A., Phys. Rev. B 73 054431 (2006).

[2] Maleyev S. V., Phys. Rev. B 73, 174402 (2006).

[3] Janoschek M., Bernlochner F., Dunsiger S., Pfleiderer C., Böni P., Roessli B., Link P., and Rosch A., arXiv:0907.5576v1 (2009).

This work was supported by the NSF (Grant No. PHY05-51164) and by the SFB 608 of the DFG.

I3: Electronic properties of correlated oxides (Sweeney F)

Monday, 13:30-14:20

Infrared spectroscopy and nano-imaging of correlated electron matter

Dmitri N. Basov, University of California, San Diego http://infrared.ucsd.edu/

Infrared experiments enable an experimental access to the kinetic energy of mobile electrons and thus allow one to quantify the strength of correlations in solids /M.Qazilbash et al. Nature-Physics 5, 647 (2009)/. This analysis uncovers a common aspect of a variety of unconventional superconductors including cuprates, pnictides, and ruthenates. All these systems reveal substantial suppression of the electronic kinetic energy compared to expectations of the band theory. Infrared nano-imaging experiments show that the electronic correlations in VO_2 are enhanced in the vicinity of the insulator-to-metal transition /Qazilbash et al. Science 318, 1750 (07)/. Electronic phase separation in VO_2 appears to be responsible for persistent changes of resistance and capacitance in this enigmatic compound /Driscoll et al Science 325, 1518 (2009)/.

Band narrowing and Mott localization in iron oxychalcogenides $La_2O_2Fe_2O(Se,S)_2$

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Bad metal properties have motivated a description of the parent iron pnictides as correlated metals on the verge of Mott localization. What has been unclear is whether interactions can push these and related compounds to the Mott insulating side of the phase diagram. Here we consider the iron oxychalcogenides $La_2O_2Fe_2O(Se,S)_2$, which contain an Fe square lattice with an enlarged unit cell. We show theoretically that they contain enhanced correlation effects through band narrowing compared to LaOFeAs, and we provide experimental evidence that they are Mott insulators with moderate charge gaps. We also discuss the magnetic properties in terms of a Heisenberg model with frustrating J_1-J_2-J_2' exchange interactions on a "doubled" checkerboard lattice.

Funding for this work provided by the National Nuclear Security Administration of the U.S. DOE at LANL under Contract No. DE-AC52-06NA25396, the U.S. DOE Office of Science, and the LDRD Program at LANL (J.-X.Z.), the NSF Grant No. DMR-0706625, the Robert A. Welch Foundation Grant No. C-1411, and the W. M. Keck Foundation (R.Y. and Q.S.), the NSFC Grant No.10974175 and 10874147, the National Basic Research Program of China Grant No. 2009CB929104, and the PCSIRT of ChinaContract No. IRT0754 (H.W., J.D. and M.F.), and DoD MURI (L.L.Z. and E.M.).

I4: Heavy fermions I (Sweeney A)

Monday, 13:30-14:20

Phenomenology and fundamental basis for the heavy fermions

Chandra Varma, University of California, Riverside.

An effective Hamiltonian for the heavy-fermion problem and its criticality are provided based on the solution of single impurity and two impurities in a self-consistent media, and variational approximation to the lattice problem both for the paramagnetic and the antiferromagnetic state. A discussion of the energy scales deduced for the problem from the dilute to the concentrated limit and its basis in fundamental theory is also provided.

Frustrated heavy fermions

Moosung Kim and ***Meigan Aronson***, Stony Brook University

Many of the R_2T_2X (R=rare earth, T=transition metal, X=Pb,Sn,Sb,Bi) form layered compounds where the R atoms lie on triangular units in the geometically frustrated Shastry-Sutherland lattice (SSL)[1]. Depending on the relative strengths of the first and second neighbor exchange interactions, these compounds either order antiferromagnetically or show spin liquid properties [2]. These R_2T_2X compounds are metallic, and thus offer the promise of studying the effects of geometric frustration on quantum criticality. Yb_2Pt_2Pb and Ce_2Pt_2Pb are of special interest, as they lie very near this antiferromagnetic quantum critical point. Yb_2Pt_2Pb orders antiferromagnetically at 2 K, with unusually strong fluctuations in the paramagnetic state. The ordered state is Fermi liquid-like with a Sommerfeld coefficient g=0.05 J/mol-K^2[3]. The phase behavior with magnetic field is very complex,[4] terminating in a sequence of magnetization plateaux, as observed previously in insulating SSL systems[5]. In contrast, Ce_2Pt_2Pb appears to be on the spin liquid side of the QCP, and here the ground state is heavy fermion-like, with g-0.6 J/mol-K^2. Our results suggest that heavy-fermion behavior occurs near the quantum

critical point in this class of SSL compounds, as for unfrustrated heavy fermion compounds, but is strongly suppressed by magnetic ordering.

[1] B. S. Shastry and B. Sutherland, 1981, ``Exact ground state of a quantum mechanical antiferromagnet'', Physica 108B, 1069.

[2] A. Isacsson and O. F. Syljuasen, Phys. Rev. E 74, 026701 (2006).

[3] M. S. Kim, M. C. Bennett, and M. C. Aronson, 2008b, ``Yb_2Pt_2Pb: Magnetic frustration in the Shastry-Sutherland lattice'', Phys. Rev. B77, 144425.

[4] M. S. Kim, Y. -J. Jo, and M. C. Aronson, 2009 (unpublished).

[5] H. Kagayama, K. Yoshimura, R. Stern, N. V. Mushikov, K. Onizuka, M. Kato, K. Kosuge, C. P. Slichter, T. Goto, and Y. Ueda, 1999, ``Exact dimer ground state and quantized magnetization plateaus in the two dimensional spin system $SrCu_2(BO_3)_2$'', Phys. Rev. Lett. 82, 3168.

P2: Fermiology (Sweeney F)

Monday, 16:45-18:25

Entropy and the formation of an electronic nematic in $Sr_3Ru_2O_7$

A. P. Mackenzie, A.W. Rost, J. F. Mercure, and R. S. Perry, University of St Andrews, S. A. Grigera, Instituto de Física de liquidos y sistemas biologicos, UNLP

The layered perovskite metal $Sr_3Ru_2O_7$ has generated interest because of the discovery of nematic-like electrical transport properties at low temperatures [1]. The unusual properties are seen in the vicinity of a metamagnetic quantum critical point. They appear to be the result of the formation of a new phase, which can be observed only in the highest purity single crystals, with mean free paths of several thousand angstroms. Recently, my group has concentrated on understanding this phase and determining its boundaries using thermodynamic probes. In this talk I will review the physics that we believe underlies our observations, and then report on the recent progress, showing how measurements of the specific heat and magneto-caloric effect enable the determination of a complete 'entropy landscape' of phase formation in the vicinity of a quantum critical point [2]. I will also discuss the discovery of de Haas-van Alphen oscillations within the putative electronic nematic phase [3].

[1] R.A. Borzi *et al*., Science **315**, 214 (2007).
[2] A.W. Rost *et al*.,Science **325**, 1360 (2009).
[3] J.-F. Mercure *et al*., Phys. Rev. Lett. **103**, 176401 (2009).

ARPES of iron pnictides

Sergey Borisenko, IFW-Dresden

We have studied the electronic structure of the Fe-pnictides using angle-resolved photoemission spectroscopy. Among them is a non-magnetic LiFeAs (T_c~18K) superconductor. In LiFeAs we find a notable absence of the Fermi surface nesting, strong renormalization of the conduction bands by a factor of three, high density of states at the Fermi level caused by a Van Hove singularity, strong coupling to phonons and no evidence for either a static or fluctuating order except superconductivity with in-plane isotropic energy gaps. Our observations suggest that these electronic properties capture the majority of ingredients necessary for the superconductivity in iron pnictides [1,2].

[1] S. V. Borisenko et al., arXiv:1001.1147

[2] A. A. Kordyuk et al., arXiv:1002.3149

The project was supported, in part, by the DFG under Grants No. KN393/4, BO 1912/2-1, BE1749/13, 486RUS 113/982/0-1 as well as priority program SPP1458. I.V. Morozov also acknowledges support from the Ministry of Science and Education of the Russian Federation under State Contract P-279.

Complete Fermi surface mapping by quantum oscillation measurements in underdoped YBCO

Suchitra E. Sebastian, U. of Cambridge Neil Harrison, NHMFL, Los Alamos, Paul A. Goddard, U. of Oxford, Moaz M. Altarawneh, Charles H. Mielke, NHMFL, Los Alamos, Ruixing Liang, Doug A. Bonn, Walter N. Hardy, U. of British Columbia, Ole K. Andersen, Max Planck Institute, Stuttgart, Gilbert G. Lonzarich, U. of Cambridge

Quantum oscillation measurements as a function of magnetic field and angle are presented on the underdoped cuprate $YBa_2Cu_3O_{6+x}$ over a wide magnetic field range up to 85T, and a broad angular range in both polar and azimuthal angles, measured between 100 mK and 20K. We show that Fermi Dirac statistics govern the elementary excitations even in this strongly correlated material in close proximity to the Mott insulating phase. The angular dependence of these high resolution measurements enables multiple small sections of the Fermi surface with different topologies to be distinguished and located at different locations in the Brillouin zone [1]. Both electron and hole pockets are indicated, implying reconstruction by a translational-symmetry breaking order parameter. While the precise nature of this order parameter remains elusive, we demonstrate via our measurements that it must involve spin degrees of freedom. We further trace a single small section of Fermi surface toward the Mott insulating regime, and find a dramatic increase in effective mass at a metal-insulator quantum critical point (QCP), located under a local maximum in the YBCO superconducting dome. Possible mechanisms that drive this QCP, and their potential relation to enhanced superconducting temperatures are further investigated.

[1] S. E. Sebastian et al. http://arxiv.org/abs/1001.5015 (2010).

TUESDAY JUNE 29, 2010

7:30-8-30 Complimentary Breakfast

P3: Plenary - Strongly correlated fermions **Chair: Malcolm Boshier** Sweeney F

8:30-9:10 ***Randall G Hulet***
Spin-polarization of a one-dimensional Fermi gas

9:10-9:40 ***Daniel F. Agterberg***
FFLO and pair density wave phases in strongly correlated materials

9:40-10:10 ***Corinna Kollath***
Quantum simulations with strongly correlated ultracold gases

10:10-10:40 BREAK

I5: Invited - Correlated superconductors **Chair: David Pines** Sweeney F

10:40-11:10 ***Kamran Behnia***
Nernst effect as a probe of quantum criticality in graphite

11:10-11:40 ***Ernst Bauer***
Superconductivity in absence of inversion symmetry: Are correlations the ultimate driving power?

11:40-12:00 ***Philip Phillips***
Dynamical spectral weight transfer and anomalous transport in the cuprates

I6: Invited - Spin excitations and Magnetic Ordering **Chair: Keith McEwen** Sweeney A

10:40-11:10 ***Yoshio Kitaoka***
Novel superconducting phases in copper oxides and iron-based compounds: NMR studies

11:10-11:40 ***Robert J McQueeney***
Systematic evolution of magnetism with doping in AFe_2As_2 superconductors

11:40-12:00 ***Almut Shroeder***
Signatures of a quantum Griffiths phase close to a ferromagnetic quantum critical point

12:00-13:30 LUNCH ON YOUR OWN

I7: Invited - Quantum criticality: Yb systems **Chair: Huiqiu Yuan** Sweeney F

13:30-14:00 ***Satoru Nakatsuji***
Quantum criticality in the valence fluctuating β-$YbAlB_4$

14:00-14:20 ***Gertrud Zwicknag***
$YbRh_2Si_2$: Field-induced suppression of the heavy-fermion state

I8: Invited - Kondo theory **Chair: Peter Riseborough** Sweeney A

13:30-14:00 ***Thomas Pruschke***
Phonons in the Kondo lattice model - from heavy fermion physics to superconductivity

14:00-14:20 ***Sergio G. Magalhaes***
The van Hemmen-Kondo model for disordered cerium systems

14:20-14:30 BREAK

14:30-16:45 POSTER SESSION

P4: Plenary - Correlated 4d/5d oxides **Chair: Greg Boebinger** Sweeney F

16:45-17:25 ***Hidenori Takagi***
Novel electronic phases in complex 5d Ir oxides produced by strong spin-orbit couplin

17:25-17:55 ***Michael Norman***
The electronic phase diagram of the cuprates

17:55-18:25 ***Bumjoon Kim***
Kondo-like quasiparticle formation in electron doped Sr_2IrO_4

P3: Strongly correlated fermions (Sweeney F)

Tuesday, 8:30-10:10

Spin-polarization of a one-dimensional fermi gas

Yean-an Liao, Ann-Sophie Rittner, and Tobias Paprotta, Rice University, Stefan Baur, Erich Mueller, Cornell University, ***Randall Hulet**, Rice University*

We have performed experiments on the pairing of spin-polarized 6Li atoms in both 3D and 1D geometries. In 3D, we find phase separation between a fully paired core and the surrounding unpaired atoms. No evidence for the elusive Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) modulated superfluid state was found. Theory predicts that the FFLO state is ubiquitous in the 1D phase diagram, however, and we have initiated a 1D experiment to verify these predictions. A two-dimensional array of effectively one-dimensional tubes are formed by imposing a two-dimensional optical lattice on the atoms. We find that phase separation also occurs in 1D, but in contrast to 3D the central core is always partially polarized, while the outer wings are either fully paired or fully polarized, depending on the overall degree of spin polarization [1]. The experimental phase diagram agrees well that that calculated by Bethe ansatz. Theory predicts that the partially polarized phase is the FFLO state. We are attempting to directly observe the predicted non-zero center-of-mass momentum of the FFLO pairs by time-of-flight imaging.

[1] Yean-an Liao *et al*., arXiv:0912.0092.

Funding for this work provided by DARPA/ARO, NSF, ONR, Welch Foundation, and the Keck Foundation.

FFLO and pair density wave phases in strongly correlated materials

***Daniel F. Agterberg**,* University of Wisconsin – Milwaukee, Manfred Sigrist , ETH-Zurich Hirokazu Tsunetsugu, ISSP, University of Tokyo, Zhichao Zheng, University of Wisconsin - Milwaukee

With the groundbreaking work of Fulde, Ferrell, Larkin and Ovchinnikov (FFLO), it was realized that superconducting order can also break translational invariance, leading to a phase in which the Cooper pairs develop a coherent periodic spatially oscillating structure. Such pair density wave (PDW) superconductivity has become relevant in a diverse range of systems, including cuprates, organic superconductors, heavy-fermion superconductors, cold atoms, and high-density quark matter. Here I discuss theories of PDW/FFLO superconductors focusing on two aspects. The first relates to the vortex/dislocation topological defects and the resulting consequences on the superconducting state [1]. The second examines the consequences of co-existing PDW order and d-wave superconductivity at high fields in $CeCoIn_5$ [2].

[1] D.F. Agterberg and H. Tsunetsugu, Nature Physics 4, 639 (2008).

[2] D.F. Agterberg, M. Sigirst, and H. Tsunetsugu, Phys. Rev. Lett. 102, 207004 (2009).

Funding for this work provided in part by NSF DMR-0906633.

Quantum simulations with strongly correlated ultracold gases

Corinna Kollath, CPHT, CNRS, Ecole Polytechnique

Atomic gases cooled to Nanokelvin temperatures are a new exciting tool to study a broad range of quantum phenomena. In particular, an outstanding degree of control over the fundamental parameters, such as interaction strength, spin composition, or dimensionality, has been achieved. This has facilitated access to strongly correlated

quantum many body physics in exceptionally clean samples. The outstanding tunability allows to rapidly change the system parameters, even in real time, and to observe the subsequent quantum evolution. The cleanliness and the good tunability of these cold quantum gases opens the door to simulate systems from other areas of physics. For example, artificial periodic structures for the atomic gas can be created using laser light to mimic condensed matter systems. I will report on recent theoretical and experimental progress on the realization of these strongly correlated ultracold gases in optical lattices and their response to perturbations from equilibrium.

Funding for this work has been provided by the Triangle de la Physique, the DARPA-OLE program and ANR (FAMOUS).

I5: Correlated superconductors (Sweeney F)

Tuesday, 10:40-12:00

Nernst effect as a probe of quantum criticality in graphite

Zengwei Zhu, Fauqué Benoît, Huan Yang, and ***Kamran Behnia***, ESPCI

The effect of quantum criticality on thermoelectric response has been the subject of a number of recent experimental studies. Here, we focus on the particular case of graphite in the vicinity of the quantum limit[1]. Each time a Landau tube leaves the Fermi surface there is a van Hove singularity in the density of states. The Nernst coefficient sharply peaks and displays hallmarks of quantum criticality including a temperature-independent critical field. We argue that a quantum topological phase transition occurs whenever a squeezed Landau level leaves the Fermi surface and this leads to a hitherto unexplored case of quantum criticality

[1] Z. Zhu,et al., Nature Physics, 6, 26 (2010).

Superconductivity in absence of inversion symmetry: Are correlations the ultimate driving power?

E. Bauer, R.T. Khan, F. Kneidinger, E. Royanian, G. Hilscher, H. Michor, and G. Rogl, Vienna University of Technology, E.-W. Scheidt, University of Augsburg, K. Miliyanchuck, P. Podloucky, P. Rogl, University of Vienna

Superconductivity in materials without inversion symmetry (NCS) in the respective crystal structures occurs in the presence of an antisymmetric spin-orbit coupling as a consequence of an intrinsic electric field gradient. The superconducting condensate is then a superposition of spin-singlet and spin-triplet Cooper pairs. This scenario accounts for various experimental findings such as nodes in the superconducting gap or extremely large upper critical magnetic fields found in superconductors like $CePt_3Si$ or $CeRhSi_3$. Spin-triplet pairing can happen in a NCS environment in spite of Anderson's theorem that spin-triplet pairing requires a crystal structure that exhibits inversion symmetry. A central issue that emerges when debating physical properties of non-centrosymmetric superconductors concerns the role of strong correlations among electrons.The aim of this paper is to compare superconductors without inversion symmetry based either on materials with strong electron correlations (e.g., heavy fermions) or on materials which do not possess significant correlations like recently found 1-1-3 compounds such as $BaPtSi_3$ or Mo_3Al_2C. This allows disentangling the various states and contributions observed in such unconventional superconductors.

Work supported by the Austrian FWF P22295.

Dynamical spectral weight transfer and anomalous transport in the cuprates

Phillip Phillips, University of Illinois

I focus on two experimental puzzles in the underdoped to optimally doped cuprates: 1) the origin of the abrupt sign change of the thermoelectric power near optimal doping for a wide class of cuprate superconductors and 2) the origin of the temperature dependence of the Hall coefficient. The latter has been fit[1], without microscopic justification, to a two-fluid model in which one of the components scales with the nominal doping level and the other is thermally activated with an excitation energy proportional to the pseudogap energy scale. Within the context of the Hubbard model, I will show that the sign change of the thermopower in a doped Mott insulator arises from dynamical spectral weight transfer across the Mott gap. Further, such dynamical mixing plays a central role in the temperature dependence of the Hall coefficient. Starting from the effective low energy theory of a doped Mott insulator[2] obtained by exactly integrating out the high-energy scale, I show that the effective carrier density in the underdoped regime reproduces the two-fluid model of Gor'kov and Teitel'baum [1]. The doping dependence of the resultant activation energy is in excellent agreement with the experimentally determined pseudogap scale in the cuprates.

1. L.P.Gor'kov and G.B.Teitel'baum Phys. Rev. Lett. 97, 247003 (2006).
2. S. Chakraborty and P. Phillips, Phys. Rev. B 80, 132505 (2009).

I6: Spin excitations and magnetic ordering (Sweeney A)

Tuesday, 10:40-12:00

Novel superconducting phases in copper oxides and iron-based compounds: NMR studies

Yoshio Kitaoka, H. Mukuda, S. Shimizu and M.Yashima, Graduate School of Engineering Science, Osaka University, Toyonaka, Osaka 560-8531 Japan, P. Shirage , K. Miyazawa , H. Eisaki and A. Iyo,National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki 305-8568, Japan.

The phase diagrams of AFM and SC in multilayered cuprate systems, particularly in n = 4 and 5 compounds, are remarkably different from those established for LSCO (n=1) and YBCO (n=2), in which the AFM order collapses by doping a very small number of holes having N_h ~0.02 and N_h ~ 0.055, respectively. The QCPs for n = 4 and 5 compounds are located at higher doping levels than those for n=1 and 2 compounds; hence, the AFM uniformly coexists with SC. When n decreases from 5 to 4, the QCP moves to a lower hole-doped region, suggesting that interlayer magnetic coupling $[J_c J_{out}(n)]^{1/2}$ becomes stronger with increasing n, which stabilizes the AFM order. Here, J_c is magnetic coupling between interunit cells, which is independent of n, but $J_{out}(n)$ is magnetic coupling between intraunit cells, which increases with n. We deduce that 1) independent of n, AFM moment decreases with doping and collapses for $0.17< N_h< 0.19$; 2) T_N increases as the out-of plane coupling $J_{out}(n)$ increases; 3) the in-plane superexchange $J_{in}(N_h)$ for n =4 and 5 is larger than $J_{in}(\square)$ ~ 1300 K for infinite layered $Ca_{0.85}Sr_{0.15}CuO_2$. Though T_c is maximum close to the QCP, the results presented here strongly suggest that the AFM interaction plays a vital role in T_c by acting as the glue for the Cooper pairs, which will lead us to a genuine understanding of why T_c of cuprate superconductors is very high. We also report NMR/NQR studies of FeAs-based superconductors.

Systematic evolution of magnetism with doping in AFe_2As_2 superconductors

Robert McQueeney, Iowa State University/Ames Laboratory

The AFe_2As_2 (A=Ba,Sr,Ca) based superconductors (SC) are antiferromagnetic (AFM) metals with a layered crystal structure. Electron doping suppresses the AFM transition and leads to the appearance of a SC phase in the presence of AFM spin fluctuations. We have studied the evolution of static magnetic order and spin excitations as a function of doping in $Ba(Fe_{1-x}Co_x)_2As_2$ using neutron and x-ray scattering. The spin wave spectra in the AFM parent compounds (A=Ca) reveal large magnetic exchange within the Fe layers and weaker interlayer exchange.

Spin fluctuations in the optimally doped SC compositions (x > 7%), with no long-range AFM order, are more two-dimensional (2D) in character and highlighted by a 2D magnetic resonance feature that develops below T_C. Within a narrow compositional range (3 < x < 6%) at the onset of SC, AFM and SC can actually coexist and compete with each other. This competition is revealed by a strong suppression of the AFM order parameter below T_C. The spin excitations in the underdoped compositions are notably more 3D than optimally doped compositions, including a magnetic resonance that has strong c-axis dispersion. Overall, the results suggest that the approach to SC in $Ba(Fe_{1-x}Co_x)_2As_2$ coincides with competing weak magnetic order and a crossover in the dimensionality of the system.

Signatures of a quantum Griffiths phase close to a ferromagnetic quantum critical point

Almut Schroeder and Sara Ubaid-Kassis, Kent State University, Thomas Vojta, Missouri University of Science and Technology

We present magnetization (M) measurements of the d-metal alloy $Ni_{1-x}V_x$ at vanadium concentrations above x_c ≈11.4% where the onset of long-range ferromagnetic order is suppressed to zero temperature. The temperature (T) dependence of the magnetic susceptibility is best described by simple nonuniversal power laws, $M/H(T,H\rightarrow 0) \sim T^{-\lambda}$, rather than Curie Weiss laws. Moreover, the magnetic field (H) dependence of the low-temperature magnetization displays power laws $M \sim H^{1/\delta}$ with $\delta = 1/\gamma$. This leads to H/T scaling of the magnetization in a wide temperature (10K < $T \leq$ 300K) and field ($H \leq$ 5T) range. The exponent γ is strongly x dependent, decreasing from 1 at $x \approx x_c$ to $\gamma < 0.1$ for x=15%. This behavior clearly differs from both classical and quantum critical behavior in a clean 3D ferromagnet. Instead, it closely follows the predictions for a quantum Griffiths phase associated with a quantum phase transition in a disordered metal.

Funding for this work provided by NSF (DMR-0306766, DMR-0339147, DMR-0906566) and Research Corporation

I7: Quantum criticality: Yb systems (Sweeney F)

Tuesday, 13:30-14:20

Quantum criticality in the valence fluctuating β-$YbAlB_4$

S. Nakatsuji, Y. Matsumoto, K. Kuga, T. Tomita, N. Horie, Institute for Solid State Physics, University of Tokyo, Kashiwa 277-8581, Japan

Archetypical examples of Fermi liquid instability at zero temperature have been found in heavy-fermion intermetallics. So far, quantum critical materials of this kind are known to have an almost integral valence to stabilize local moments considered essential for the criticality. On the contrary, valence fluctuations generally promote the screening of local moments and consequently suppress the critical phenomena. In this presentation, we show that the mixed valent f-electron superconductor β-$YbAlB_4$ exhibits quantum criticality at practically zero field [1-4]. In particular, our high precision magnetization measurement has probed the quantum critical scaling properties down to far lower temperatures than the large energy scale of the local physics due to intermediate valence. The systematic evolution of the magnetism found in our recent doping experiments will be also presented [5].

This is the work performed in collaboration with T. Tayama, Y. Shimura, T. Sakakibara, Y. Karaki, Y. Uwatoko, M. Okawa, and S. Shin (ISSP, Univ. of Tokyo), A. Nevidomskyy and P. Coleman (Rutgers Univ.).

[1] S. Nakatsuji et al., Nature Phys. 4, 603 (2008).
[2] K. Kuga et al., Phys. Rev. Lett. 101, 137004 (2008).
[3] M. Okawa et al., arXiv:0906.4899.
[4] Y. Matsumoto et al., preprint (2010).
[5] K. Kuga et al., preprint (2010).

$YbRh_2Si_2$: Field-induced suppression of the heavy-fermion state

Gertrud Zwicknagl, Techn. Universitaet Braunschweig

We present calculations of the magnetic field-induced changes of the heavy quasiparticles in $YbRh_2Si_2$ which are reflected in thermodynamic and transport properties. The quasiparticles are determined by means of the Renormalized Band Method. The progressive de-renormalization of the quasiparticles in the magnetic field is accounted for using fielddependent quasiparticle parameters deduced from Numerical Renormalization Group studies. Consequences for the interpretation of experimental data are discussed.

I8: Kondo theory (Sweeney A)

Tuesday, 13:30-14:20

Phonons in the Kondo lattice model - from heavy fermion physics to superconductivity

Oliver Bodensiek, ***Thomas Pruschke***, Theoretical Physics, University of Goettingen, Germany, Rok Zitko, J. Stefan Institute, Ljubljana, Slovenia

We study the Kondo lattice model with an additional Einstein phonon mode coupled via a Holstein term to the electrons within the dynamical mean-field theory. As impurity solver we use the numerical renormalization group. We present results for the paramagnetic case showing the anticipated heavy Fermion physics, including direct evidence for the appearance of a large Fermi surface for antiferromagnetic exchange interaction. Lattice degrees of freedom tend to effectively suppress the Kondo effect, leading to strongly reduced low-energy scale. For too large electron-phonon coupling we observe a complete collapse of the heavy Fermi liquid and the formation of polarons. By introducing a Nambu notation, we find that increasing electron-phonon coupling favors superconductivity, which however is not BCS like but shows additional structures in the density of states and the gap function. Due to the latter there is a distinction between the mean-field gap and the gap observed in the tunneling density of states. We investigate the dependency of T_c and D on the model parameters and address the question how this superconducting states competes with the antiferromagnetism close to half filling.

The van Hemmen-Kondo model for disordered cerium systems

Sergio G. Magalhaes, and Fabio M. Zimmer, Universidade Federal de Santa Maria, Bernard Coqblin, L. P. S.,Université Paris-Sud

The interplay between disorder and strong correlations has been observed experimentally in disordered Cerium alloys such as Ce(Ni,Cu) or Ce(Pd,Rh). In the case of Ce(Ni,Cu) alloys with a Cu concentration x between 0.6 and 0.3, the first studies have shown a smooth transition with decreasing temperature from a spin glass phase to ferromagnetism; for x smaller than 0.2, a Kondo phase has been observed. The situation is more complicate now due to the recent observation of magnetic clusters. The competition between the Kondo effect, the spin glass (SG) and the ferromagnetic (FE) ordering has been extensively studied theoretically. The Kondo effect is described by the usual mean field approximation; we have treated the SG behaviour successively by the Sherrington-Kirkpatrick model, then by the Mattis model and finally by the van Hemmen model, which takes both a ferromagnetic part and a site-disorder random part for the inter-site exchange interaction. We present here the results obtained by the van Hemmen-Kondo model: for a large Kondo exchange Jk, a Kondo phase is obtained, while, for smaller Jk, the

succession of a spin glass phase, a mixed SG-FE one and finally a FE one has been obtained with decreasing temperature. This model improves the theoretical description of disordered Kondo systems, can account for experimental data and provides a simpler approach for further calculations of magnetic clusters.

P4: Correlated 4d/5d oxides (Sweeney F)

Tuesday, 16:45-18:25

Novel electronic phases in complex 5d Ir oxides produced by strong spin-orbit coupling

Hidenori Takagi, University of Tokyo & RIKEN

Zoology of complex 5d Ir oxides, a new playground for spin-orbit coupling (SOC) physics, will be presented. Layered perovskite Sr_2IrO_4 is a Mott insulator despite that its conduction band consists of spatially extended 5d orbitals. It was pointed out that the strong SOC of ~0.5 eV [1] inherent to 5d orbitals creates a half-filled and narrow J_{eff}=1/2-like band and gives rise to a SOC-induced Mott state even with a much smaller U than those of 3d transition metal oxides. From a selection rule observed in the magnetic resonant x-ray scattering, we demonstrate that the ground state is in fact close to a J_{eff}=1/2 antiferromagnet. Such SOC-induced Mott state was found also in double layer $Sr_3Ir_2O_7$, honeycomb Na_2IrO_3 and spinel Ir_2O_4. The latter two compounds were suggested theoretically [3] to be a possible correlated topological insulator. Metallic analogues of Sr_2IrO_4, including orthorhombic and hexagonal $SrIrO_3$, were also visited and found to be a semimetal with a very small number of electrons and holes and with an enhanced Wilson ratio R_W~10. We argue that those unusual states are formed by an interplay of the SOC and the lattice distortion.

[1] B.J.Kim et al., PRL **101**, 076402 (2008).
[2] B. J. Kim et al., Science **323**, 1329 (2009).
[3] A. Shitade et al., PRL 102, 256403 (2009).

Work done in collaboration with T.Takayama, B.J.Kim, K.Ohashi, H.Kuriyama, J.Matsuno, S.Fujiyama, R.S. Perry, H.Osumi and T.Arima

The electronic phase diagram of the cuprates

Michael Norman, Argonne National Laboratory

Recent angle resolved photoemission data of our group addresses the nature of the excitations in the normal state of the cuprate superconductors [1]. This normal state is characterized by two crossover temperature scales: T* which marks the onset of an energy gap, and T_{coh} which marks the onset of sharp spectral peaks. We find that these two crossover scales are strongly doping dependent, and cross each other near optimal doping, as predicted by certain theories of cuprates based on doped Mott insulators. Moreover, superconductivity only occurs below both temperature scales. More interestingly, optimal superconductivity emerges from an unusual normal state below these two crossovers that is characterized by gapped, coherent excitations.

[1] U. Chatterjee et al., unpublished.

This work was supported by the US DOE, Office of Science, under Contract No. DE-AC02-06CH11357.

Kondo-like quasiparticle formation in electron doped Sr_2IrO_4

B. J. Kim, Univ. of Michigan

Sr_2IrO_4 is a novel type of Mott insulator induced by relativistic spin-orbit coupling, and a rare realization of the single-band Mott-Hubbard system in a quasi-two-dimensional square lattice [1,2]. Due to its similarities in crystal, electronic, and magnetic structure to high temperature superconducting cuprates, as well as its unique features, such as orbital-dominated magnetic moment and the quantum phase associated with it, it is interesting to investigate metallic phases in proximity to the Mott insulating state. In this talk, I will present spectral evolution across the insulator-metal transition achieved by in-situ doping method and registered by angle-resolved photoemission. I will present clear evidences of quasiparticles emerging in the Mott gap as Kondo-like resonances, consistent with the dynamical mean-field theory (DMFT) description of the Mott transition. Our results provide a first verification on the validity of DMFT based on infinite dimension, in a 2D material.

[1] B. J. Kim et al., Phys. Rev. Lett. 101, 076402 (2008)
[2] B. J. Kim et al., Science 323,1329 (2009)

WEDNESDAY JUNE 30, 2010

7:30-8-30 Complimentary Breakfast

P5: Plenary - Heavy fermions II **Chair: Brian Maple** Sweeney F

8:30-9:10 ***Jacques Flouquet***
Trends in heavy fermion matter: past and future

9:10-9:40 ***Jon Lawrence***
Heavy fermion scaling: Uranium versus cerium and ytterbium compounds.

9:40-10:10 ***Peter Woelfle***
Quantum critical behavior of heavy fermion compounds: Extended Fermi liquid theory

10:10-10:40 BREAK

I9: Invited - Heavy fermion superconductivity **Chair: Toshiro Sakakibara** Sweeney F

10:40-11:10 ***Andrea Bianchi***
Pauli paramagnetism and superconducting vortices in $CeCoIn_5$

11:10-11:40 ***Anne de Visser***
Superconducting ferromagnets: the test case system UCoGe

11:40-12:00 ***Rebecca Flint***
Tandem pairing in heavy fermion superconductors

I10: Invited - SCES in reduced dimensions **Chair: Laura Greene** Sweeney A

10:40-11:10 ***Yuji Matsuda***
Confining heavy fermions to two dimension

11:10-11:40 ***E.V. Sampathkumaran***
Magnetism of nano particles of Kondo lattices, obtained by high-energy ball-milling

11:40-12:00 ***Leonardo Degiorgi***
The charge-density-wave state in the two-dimensional layered rare-earth tri-tellurides

12:00-13:00 LUNCH ON YOUR OWN

13:00-17:30 EXCURSION

18:30-21:30 BANQUET

P5: Heavy fermions II (Sweeney F)

Wednesday, 8:30-10:10

Trends in heavy fermion matter: past and future

Jacques Flouquet, CEA-Grenoble

We will review some of the main steps realized in heavy fermion matter with special focus on temperature, pressure and magnetic field phase diagram starting from Ce metal case discovered six decades ago, going through the metal insulator transition of mixed valence systems , focusing on so called hidden order phase and finally on magnetic instabilities with the observation of non-Fermi liquid properties and emergence of unconventional superconductivity. Continuous discoveries of new material have strongly helped to clarify the complex heavy fermion matter as well as progresses in extreme conditions for macroscopic and microscopic probes. We will point out some unsolved problems and thus try to reemphasize that the rush to new cases may continue to illuminate the field of strongly correlated electron systems.

Heavy fermion scaling: Uranium versus cerium and ytterbium compounds.

Jon Lawrence, University of California, Irvine, CuiHuan Wang, Oak Ridge National Laboratory, Eric Bauer, Los Alamos National Laboratory

This talk [1] explores differences between rare-earth-based and uranium-based heavy Fermion (HF) compounds that reflect the underlying difference between local 4f moments and itinerant 5f moments. The focus is on the scaling laws relating the low temperature neutron spectra to the specific heat and susceptibility. The scaling laws are seen to work very well for the rare earth compounds. For a number of key uranium compounds, however, the scaling laws fail badly. There are two main reasons for this failure. First, the scaling laws require knowledge of the high temperature entropy and moment, which are often undetermined for itinerant 5f electrons. Second, the scaling laws neglect the presence of antiferromagnetic (AF) fluctuations, which contribute significantly to the specific heat. By making plausible corrections for both effects, good agreement with the scaling laws is obtained for the uranium compounds. We point out that while both the uranium HF compounds and the rare earth intermediate valence (IV) compounds have spin fluctuation characteristic energies greater than ~ 10 meV, they differ in that the AF fluctuations that are usually seen in the U compounds are never seen in the rare earth IV compounds. This suggests that the 5f itineracy increases the f-f exchange relative to the rare earth case.

[1] www.physics.uci.edu/~jmlawren/UvsREpptTalk.pdf

Research at UC Irvine supported by the U.S. Department of Energy, Office of
Basic Energy Sciences, Division of Materials Sciences and Engineering under Award DE-FG02-03ER46036.

Quantum critical behavior of heavy-fermion compounds: Extended Fermi liquid theory

Peter Woelfle, ITKM, Karlsruhe Institute of Technology, Germany

We consider the modifications of the Fermi liquid behavior in the quantum disordered phase on approaching the critical point. At low energies, the quasiparticle properties effective mass, Landau parameters and the q.p. scattering amplitude develop in a characteristic way as a function of the control parameter measuring the closeness to the transition. At higher energies, non-Fermi liquid behavior arises. In the regime of high magnetic

field the latter may be calculated within a slave boson theory of the Kondo lattice model. Applications to ESR and transport properties will be discussed.

I9: Heavy fermion superconductivity (Sweeney F)

Wednesday, 10:40-12:00

Pauli paramagnetism and superconducting vortices in $CeCoIn_5$

A. D. Bianchi , University of Montreal, J. S. White, University Birmingham, P. Das, M. R. Eskildsen, L. De Beer-Schmitt, University Notre Dame, E. M. Forgan, Birmingham, M. Kenzelmann, M. Zolliker, S. Gerber, J. L. Gavilano, Paul Scherrrer Institut, J. Mesot, PSI and EPFL, R. Movshovich, E. D. Bauer, J. L. Sarrao Los Alamos, and C. Petrovic, Brookhaven

We report on the magnetic field (H) dependence of the form factor $|F|^2$ of the vortex lattice (VL) in $CeCoIn_5$ obtained by small angle neutron scattering for *H* applied along the crystallographic *c*-axis. Superconductivity (SC) in $CeCoIn_5$ has several unconventional aspects to it: *d*-wave superconductivity is in competition with antiferromagnetic order, as suggested by the presence of a magnetic quantum critical point located at the upper critical field H_{c2}, which in this compound is set by the Pauli-Clogston-Chandrasekhar limit. At all temperatures, $|F|^2$ initially rises with increasing field before reaching a maximum, and then begins to fall again on approaching H_{c2}. At temperatures of 500mK and below, $|F|^2$ remains finite all the way up to H_{c2}, where the FLL signal disappears abruptly on entering the normal state. This finding is in contrast to that normally observed in type-II SC's, where $|F|^2$ decreases with increasing *H*. It suggests a departure from the Abrikosov-Ginzburg-Landau paradigm, where the properties of the vortex state can be described by the coherence length ξ and the penetration depth λ. Instead, the field dependence of $|F|^2$ is dominated by Pauli paramagnetic effects, which lead to a maximum in the $|F|^2$ at intermediate fields.

[1] A. D. Bianchi *et al*.; Science **319** (2008) 177.

Superconducting ferromagnets: the test case system UCoGe

Erik Slooten, Alessia Gasparini, and Ying Kai Huang, University of Amsterdam, Nakashi Naka , NIMS, Tsukuba, ***Anne de Visser***, University of Amsterdam

The unusual coexistence of ferromagnetism and superconductivity, reported for the intermetallics UGe_2 (under pressure), UIr (under pressure), URhGe and UCoGe, attracts much attention [1]. In these metallic ferromagnets superconductivity is realized well below the Curie temperature without expelling magnetic order, and, even more peculiar, superconductivity and ferromagnetism are carried by the same 5f electrons. This is at odds with the standard BCS theory for phonon-mediated s-wave superconductivity, since the ferromagnetic exchange field is expected to inhibit spin-singlet Cooper pairing. Consequently, it has been proposed – and ample evidence has been put forward – that superconducting ferromagnets are p-wave superconductors, and that superconductivity is mediated by magnetic interactions. Here we use UCoGe as a test case system to study spin fluctuation mediated spin-triplet superconductivity. We report on the response to pressure and magnetic field, which reveals that superconductivity is enhanced near the pressure and field-induced magnetic quantum critical points.

[1] A. de Visser, Superconducting ferromagnets, in: Encyclopedia of Materials: Science and Technology, Eds K.H.J. Buschow et al. (Elsevier, Oxford, 2010), pp. 1-6.

Tandem pairing in heavy fermion superconductors

Rebecca Flint, Rutgers University Piers Coleman, Rutgers University

In the highest T_c heavy fermion superconductors, the heavy electrons are forming as they pair, and the internal structure of the pair becomes as important as the forces holding it together. The 115 family of superconductors [$CeMIn_5$ (M={Co,Ir,Rh}) and $PuMGa_5$ (M={Co,Rh}) and $NpPd_5Al_2$] provide an extreme example of this phenomena, as free local moments are present down to the superconducting transition temperature. We examine the internal structure of the heavy fermion condensate to show that it necessarily consists of two types of pairs: a d-wave pair of quasiparticles on neighboring sites condensed in tandem with a d-wave composite pair of electrons bound to a local moment. We demonstrate this tandem pairing within a symplectic-N solution of the two-channel Kondo-Heisenberg model, showing that the two mechanisms couple linearly to enhance the transition temperature. Tuning the relative strengths of these interactions naturally explains the two dome structure observed in $Ce(Rh,Ir)In_5$. We also predict that the composite component will be observable as a superconducting valence shift.

Funding for this work provided by NSF DMR-0907179

I10: SCES in reduced dimensions (Sweeney A)

Wednesday, 10:40-12:00

Confining heavy fermions to two dimension

Yuji Matsuda, Hiroaki Shishido, Takasada Shibauchi, and Yuta Mizukami, Department of Physics, Kyoto University, Hiroshi Kontani, Department of Physics, Nagoya University, Takahito Terashima, Research Center for Low Temperature and Materials Sciences, Kyoto University

Electronic structure in heavy fermion compounds is essentially three-dimensional. We realized experimentally a two-dimensional heavy fermion system, adjusting the dimensionality in a controllable fashion. Artificial superlattices of the antiferromagnetic heavy fermion compound $CeIn_3$ and the conventional metal $LaIn_3$ were grown epitaxially. By reducing the thickness of the $CeIn_3$ layers, the magnetic order was suppressed and the effective electron mass was further enhanced. Heavy fermions confined to two dimensions display striking deviations from the standard Fermi liquid low-temperature electronic properties, and these are associated with the dimensional tuning of quantum criticality. We also report the superconducting properties of epitaxially thin films of $CeCoIn_5$.

[1] H. Shishido, T. Shibauchi, K. Yasu, T. Kato, H. Kontani, T. Terashima and Y. Matsuda, Science 327, 980 (2010)

Magnetism of nano particles of Kondo lattices, obtained by high-energy ball-milling

E.V. Sampathkumaran, K. Mukherjee, Kartik K Iyer, Niharika Mohapatra, and Sitikantha D Das, Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai-400005, India.

Despite intense research in the field of strongly correlated electron behavior for the past few decades, there has been very little effort to understand this phenomenon in nano particles (with sizes less than 1 μm) of the Kondo lattices. Recently, we have initiated some work in this direction to understand strong correlation effects [1] in d- and f-electron intermetallics synthesized by high-energy ball-milling. After briefly summarizing our recent efforts on new Kondo lattices which have not been paid much attention (e.g., Ce_2RhSi_3, $CeCuAs_2$ etc), we will focus on our findings on the magnetic behavior of fine particles of some Kondo lattices, based on magnetization and heat-capacity studies. For instance, $CeRu_2Si_2$, a non-magnetic heavy-fermion in the bulk form, exhibits features attributable to magnetic ordering below 8 K. However, in the composition obtained by substitution of Rh for Ru, viz., $CeRh_{1.2}Ru_{0.8}Si_2$, lying at the quantum critical point in the bulk form, magnetic ordering is not induced down to 0.5 K. Interestingly, in isostructural $CeRh_2Si_2$, magnetic ordering (seen below 36 K in bulk form) is apparently suppressed in fine particles. Results on a few other Kondo lattices also will be summarized. We hope these findings trigger intense research in this direction.

[1] S. Narayana Jammalamadaka et al, Appl. Phys. Lett. 92, 192506 (2008); Sitikantha D Das et al, Phys. Rev. B 80, 024401 (2009).

The charge-density-wave state in the two-dimensional layered rare-earth tri-tellurides

L. Degiorgi, M. Lavagnini, and F. Pfuner, ETH Zurich, R. Hackl, WMI Garching, I.R. Fisher, Stanford University

The rare-earth (R) tri-tellurides RTe_3 host an unidirectional, incommensurate CDW already well above room temperature for all R elements lighter than Dy, while in the heavy rare-earth tri-tellurides (i.e., R=Tm, Er, Ho, Dy) the corresponding transition temperature, T_{CDW1}, lies below 300 K and decreases with increasing R mass. In the latter systems, a further transition to a bidirectional CDW state occurs at T_{CDW2}, ranging from 180 K for $TmTe_3$ to 50 K for $DyTe_3$. We will present a large wealth of data collected with different spectroscopic methods, as x-ray diffraction, and infrared and Raman spectroscopy as a function of both temperature and externally applied pressure. First of all, our x-ray investigations allow us to extract the lattice constants and the CDW modulation wave-vector. We observe that the intensity of the CDW satellite peaks tend to zero with increasing pressure, thus providing direct evidence for a pressure-induced quenching of the CDW phase. With optical reflectivity method, we consistently discover that the CDW gap of RTe_3 progressively collapses when the lattice constant is reduced. Finally, we will present novel Raman scattering experiments as a function of temperature on $DyTe_3$ and on $LaTe_3$ at 6 GPa, which clearly display the emergence of the collective CDW amplitude excitations for both the uni- and bidirectional states.

THURSDAY JULY 01, 2010

7:30-8-30 Complimentary Breakfast

P6: Plenary - Magnetism and superconductivity **Chair: Kazuo Ueda** Sweeney F

8:30-9:10 ***Douglas J. Scalapino***
A common thread

9:10-9:40 ***Hai-Hu Wen***
Nodal gap in the iron-pnictide superconductors revealed by low temperature STM tunneling spectrum and angle resolved specific heat

9:40-10:10 ***Oliver Stockert***
Spin excitations as driving force for superconductivity in $CeCu_2Si_2$

10:10-10:40 BREAK

I11: Invited - FFLO **Chair: Roman Movshovich** Sweeney F

10:40-11:10 ***Michel Kenzelmann***
Coupled superconducting and magnetic order in $CeCoIn_5$

11:10-11:40 ***Youichi Yanase***
Antiferromagnetic order in the Fulde-Ferrell-Larkin-Ovchinnikov state

11:40-12:00 ***Andrew M Berridge***
A magnetic analogue of the superconducting Fulde-Ferrel-Larkin-Ovchinnikov state in $Sr_3Ru_2O_7$

I12: Invited - Pnictides **Chair: Andreas Kressig** Sweeney A

10:40-11:10 ***Anton Vorontsov***
Superconductivity and magnetism in pnictides

11:10-11:40 ***Athena S. Sefat***
Unconventional superconductivity in the simple $BaFe_2As_2$ and the complex structures

11:40-12:00 ***Gregory B. Teitel'baum***
On the formation of the soliton phase in iron pnictides

12:00-13:30 LUNCH ON YOUR OWN

I13: Invited - STM studies **Chair: Sasha Balatsky** Sweeney F

13:30-14:00 ***Ali Yazdani***
Visualizing the formation of the Kondo Lattice and the hidden order in URu_2Si_2

14:00-14:20 ***Milan Alla***n
Nematic electronic structure in the "parent" state of the iron-based superconductor $Ca(Fe_{1-x}Co_x)_2As_2$

I14: Invited - Valence fluctuations **Chair: Mucio Continentino** Sweeney A

13:30-14:00 ***Kazumasa Miyake***
Roles of critical valence fluctuations in Ce- and Yb-based heavy fermion metals

14:00-14:20 ***Andrea Severing***
Crystal-field and Kondo scale investigation of $CeMIn_5$ (M=Co, Ir, and Rh): a combined x-ray absorption and inelastic neutron study.

14:20-14:30 BREAK

14:30-16:45 POSTER Session

P7: Plenary - Correlated 4f/5f materials **Chair: Vladimir Sechovsky** Sweeney F

16:45-17:25 ***Yuri Grin***
Chemical bonding and SCES in intermetallic compounds

17:25-17:55 ***Silke Paschen***
Anisotropic transport in the Kondo insulator $CeRu_4Sn_6$

17:55-18:25 ***Yoshinori Haga***
Unconventional magnetism and superconductivity in the ternary actinide compounds $AnPd_5Al_2$

P6: Magnetism and Superconductivity (Sweeney F)

Thursday, 8:30-10:10

A common thread

Douglas J. Scalapino, University of California, Physics Department, Santa Barbara, CA

There are common material, experimental and theoretical threads linking the heavy fermion, cuprate and Fe superconductors. The materials come in families containing quasi-2D layers of correlated d or f electrons. Their temperature-doping and magnetic field phase diagrams show antiferromagnetism in close proximity to superconductivity. They exhibit quantum critical behavior. The resonant peak observed by inelastic neutron scattering in the superconducting phase provides a signature for an unconventional gap $\Delta(k + Q) = -\Delta(k)$. This resonance also implies that the same electrons are involved in both the magnetism and the superconductivity. Single-and multi-band Hubbard models exhibit a number of the properties seen in these materials. Numerical studies of the e**ff**ective pairing interaction in the single-band Hubbard model and various weak coupling calculations on multi-band models find unconventional pairing mediated by an S = 1 particle-hole channel. Thus while the heavy fermion, cuprate and Fe-pnictide (or chalcogen) materials exhibit a wide range of properties, we believe that S=1 spin and orbital fluctuation-mediated pairing provides the common thread which is responsible for superconductivity in all of these material.

I wish to acknowledge support of the Center for Nanophase Materials Science at ORNL, which is sponsored by the Division of Scientific User Facilities, U.S. DOE.

Nodal gap in the iron-pnictide superconductors revealed by low temperature STM tunneling spectrum and angle resolved specific heat

L. Shan, Y. L. Wang, B. Zeng, B. Shen, G. Mu, C. Ren, and ***H. Wen***, Institute of Physics, CAS

Low temperature specific heat has been measured on iron pnictide superconductors with various structures: 1111, 122, 11 and 42622. In the K-doped $BaFe_2As_2$ system, we found a huge specific heat jump near Tc, being much larger than the predicted value of BCS theory. This indicates a moderate electron correlation effect in this sample. Also in K-doped $BaFe_2As_2$ single crystals, we performed the low-T STM measurements, We found that the very clean tunneling spectrum shows clear evidence of a nodal superconducting gap. The angle resolved specific heat measurements are extended to the samples $FeSe_{0.5}Te_{0.5}$, a four fold oscillations were clearly shown, indicating also the evidence for a nodal gap.

[1] Gang Mu, Bin Zeng, Peng Cheng, Zhaosheng Wang, Lei Fang, Bing Shen, Lei Shan, Cong Ren, Hai-Hu Wen, arXiv:0906.4513.
[2] Gang Mu, Huiqian Luo, Zhaosheng Wang, Zhian Ren, Lei Shan, Cong Ren, Hai-Hu Wen, Phys. Rev. B 79, 174501 (2009).

Spin excitations as driving force for superconductivity in $CeCu_2Si_2$

Oliver Stockert and J. Arndt, Max-Planck-Institut CPfS, Dresden, Germany, E. Fauhaber, Technische Universität Dresden, Dresden, Germany, C. Geibel, Max-Planck-Institut CPfS, Dresden, Germany, H.S. Jeevan, Universität Göttingen, Göttingen, Germany,S. Kirchner, Max-Planck-Institut PKS, Dresden, Germany, M. Loewenhaupt, Technische Universität Dresden, Dresden, Germany, K. Schmalzl, W. Schmidt, Jülich Centre for Neutron Science at Institut Laue-Langevin, Grenoble, France, Q. Si, Rice University, Houston, USA, F. Steglich, Max-Planck-Institut CPfS, Dresden, Germany

The origin of unconventional superconductivity is still discussed controversially and of general interest. Even in the first discovered heavy-fermion superconductor $CeCu_2Si_2$ the unconventional pairing state remains puzzling. Spin excitations instead of phonons are thought to be responsible for the formation of Cooper pairs. Using high-resolution inelastic neutron scattering we observed for the first time a clear spin excitation gap of the heavy quasiparticles in the superconducting state of $CeCu_2Si_2$, at an incommensurate wave vector determined by the nesting properties of the Fermi surface. We analyze the neutron scattering data both in the superconducting and normal states, and show that there is a saving of the magnetic exchange energy as the system condenses into a superconducting state. Moreover, this magnetic energy gain is considerably larger than the superconducting condensation energy, which we determine from the specific heat data. Our calculation reveals that magnetic excitations are the primary driving force for superconductivity in $CeCu_2Si_2$. In contrast to other unconventional superconductors $CeCu_2Si_2$ has experimentally been shown to be located near a quantum critical point. This is further supported by the considerable slowing down of the magnetic normal state response seen in our data. We will compare our results to other correlated electron superconductors.

I11: FFLO (Sweeney F)

Thursday, 10:40-12:00

Coupled superconducting and magnetic order in $CeCoIn_5$

Michel Kenzelmann, Laboratory for Developments and Methods, Paul Scherrer Institute, CH-5232 Villigen

We have studied the magnetic order inside the superconducting phase of $CeCoIn_5$ for fields along the [1 0 0] crystallographic direction using neutron diffraction [1]. We find a spin-density wave order with an incommensurate modulation Q = (q,q,1/2) and q = 0.45(1), which within our experimental uncertainty is indistinguishable from the spin-density wave found for fields applied along the [1 -1 0] reciprocal direction [2]. The magnetic order is thus modulated along the lines of nodes of the d_{x2-y2} superconducting order parameter, suggesting that it is driven by the electron nesting along the superconducting line nodes. We postulate that the onset of magnetic order leads to reconstruction of the superconducting gap function and a magnetically-induced pair density wave.

[1] M. Kenzelmann, S. Gerber, N. Egetenmeyer, J. Gavilano, Th. Strässle, A.D. Bianchi, E. Ressouche, R. Movshovich, E.D. Bauer, J.L. Sarrao, J.D. Thompson, to be published, Phys. Rev. Lett.
[2] M. Kenzelmann, et al, Science 321, 1652 (2008).

Antiferromagnetic order in the Fulde-Ferrell-Larkin-Ovchinnikov state

Y*ouichi Yanase*, Niigata University, Manfred Sigrist, ETH-Honggerberg

The Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) state near the antiferromagnetic (AFM) quantum critical point (QCP) is discussed [1,2]. The AFM order in the d-wave FFLO state is studied on the basis of Bogoliubov-de Gennes equations [1]. We show that the incommensurate AFM order is stabilized in the FFLO state by the appearance of the Andreev bound state localized around the spatial nodes of the FFLO order parameter. The AFM-FFLO state is further enhanced by the induced pair density wave (PDW). The AFM order occurs in the FFLO state even when it is neither stable in the normal state nor in the BCS state. Roles of the AFM fluctuations beyond the BdG equations are discussed on the basis of the fluctuation-exchange (FLEX) approximation [2]. The relevance of the AFM-FFLO state to the field-induced magnetism in the heavy fermion superconductor $CeCoIn_5$ [3,4] is discussed on the basis of the recent experimental results. We propose experiments to examine the possibility of the FFLO superconducting state in $CeCoIn_5$.

[1] Y. Yanase and M. Sigrist, J. Phys. Soc. Jpn. 78 (2009) 114715.
[2] Y. Yanase, J. Phys. Soc. Jpn. 77 (2008) 063705.
[3] B.-L. Young et al., Phys. Rev. Lett. 98 (2007) 036402.

[4] M. Kenzelmann et al., Science 321 (2008) 1652.

This study has been supported by Grant-in-Aid for Scientific Research on Priority Areas "Superclean" (No.20029008), Grant-in-Aid for for Scientific Research on Innovative Areas "Heavy Electrons" (No.21102506), and Grant-in-Aid for Young Scientists (B) (No.20740187) from the MEXT, Japan.

A magnetic analogue of the superconducting Fulde-Ferrel-Larkin-Ovchinnikov state in $Sr_3Ru_2O_7$

Andrew M Berridge, University of Birmingham, Santiago A Grigera, UNLP and University of St Andrews, Andrew G Green, University of St Andrews, Ben D Simons, University of Cambridge

The phase diagram of $Sr_3Ru_2O_7$ contains a metamagnetic transition that bifurcates to enclose an anomalous phase with intriguing properties - a large resistivity with anisotropy that breaks the crystal-lattice symmetry [1]. We propose that this is a magnetic analogue of the spatially inhomogeneous superconducting Fulde-Ferrell-Larkin-Ovchinnikov state. Based on a microscopic theory of Stoner magnetism we derive a Ginzburg-Landau expansion where the magnetisation transverse to the applied field can become spatially inhomogeneous. We show that this reproduces the observed phase diagram of $Sr_3Ru_2O_7$ [2]. We consider the thermodynamic signatures of such transitions and the effect of the complex bandstructure of $Sr_3Ru_2O_7$.

[1] S. A. Grigera et al., Science 306, 1154 (2004); R. A. Borzi et al., Science 315, 214 (2007); A. W. Rost et al., Science 325, 1360 (2009)
[2] A.M. Berridge, A.G. Green, S.A. Grigera and B.D. Simons, Phys. Rev. Lett. 102, 136404 (2009); A.M. Berridge, S.A. Grigera, B.D. Simons and A.G. Green, Physical Review B 81, 054429 (2010).

I12: Pnictides (Sweeney A)

Thursday, 10:40-12:00

Superconductivity and magnetism in pnictides

Anton Vorontsov, Montana State University

Questions of the pairing glue, symmetry and structure of the condensed state in the Fe-based superconducting class is still open despite intense experimental and theoretical efforts. Contributors to this uncertainty are: (a) the multi-band nature of electronic structure; (b) complex phase diagram where superconductivity appears close and sometimes together with magnetism; (c) several different families of compounds with different physical properties. In this presentation I will discuss various proposed superconducting pairing states, - conventional and unconventional, including the most `popular' extended s-wave state, - their experimental signatures in transport and thermodynamic properties. In particular, I will talk about one of the most characteristic features of these materials – proximity of superconducting (SC) and magnetically ordered spin-density-wave (SDW) states. I will discuss how the interplay between these two states depends on the Fermi surface shape, the order parameter structure and the strength of SC and SDW interactions. Taking into account all theoretical predictions and comparison them with experimental findings leads to strong limitations on the pairing states possible in these materials.

Unconventional superconductivity in the simple $BaFe_2As_2$ and the more complex structures

M. A. McGuire, B. C. Sales, D. Mandrus, ORNL and UT, ***A S Sefat***, Oak Ridge National Laboratory

This talk is an overview of the various synthesis and doping techniques used in making the 122 families, and the more complex 42622, and the 32522s. An overview of some of the basic properties and the phase diagrams will be discussed.

On the formation of the soliton phase in iron pnictides

Lev P. Gor'kov, NHMFL, Florida State University, Tallahassee FL 32310, USA, ***Gregory B. Teitel'baum***, E. K. Zavoiskii Institute for Technical Physics of the RAS, Kazan 420029, Russia

Spatial coexistence of antiferromagnetic (SDW) and superconducting (SC) phases observed in iron pnictides by means of NMR, μSR and magnetic force microscopy presents the new basic feature which cannot be ascribed to the mere presence of defects in the system pinning an incomplete first order transition. We argue that inherent to iron pnictides is the tendency to formation of the new magnetic phase with deep, periodic in space, modulations of the staggered magnetization resulting in a finite density of states. Depending on the value of tuning parameters (doping or pressure), the new phase may acquire the shape of domain walls - the solitons. We derive the equations that describe the new phase. The equations not permitting an analytical approach, we establish the correspondence between this new phase in pnictides and the FFLO-state for superconductors in an exchange field where the soliton phase was studied numerically. Our analysis also shows how the domain structure grows out of the commensurate SDW thus superseding the putative 1-st order transition into paramagnetic state. We discuss experiments that prove that SC indeed emerges on the background of the soliton state. The findings bring the new insight to understanding this new class of HTSC materials where competition between magnetism and SC is currently the subject of numerous studies.

The work of L.P.G. was supported by the NHMFL through NSF cooperative agreement DMR-0654118 and the State of Florida, that of G.B.T. through the RFBR Grant N 07-02-01184.

I13: STM studies (Sweeney F)

Thursday, 13:30-14:20

Visualizing the formation of the Kondo lattice and the hidden order in URu_2Si_2

Ali Yazdani, Joseph Henry Laboratories and Department of Physics, Princeton University, Princeton, NJ 08544, USA

Heavy electronic states originating from the overlap of f orbitals underlie a rich variety of quantum phases of matter. We use atomic scale imaging and spectroscopy with the scanning tunneling microscope (STM) to examine the novel electronic states that emerge from the uranium f states in URu_2Si_2. We find that as the temperature is lowered, partial screening of the f electrons' spins gives rise to a Kondo-Fano resonance with the same periodicity as the atomic lattice. At T=17.5 K, URu_2Si_2 is known to undergo a 2^{nd} order phase transition from the Kondo lattice state into a phase with a hidden order parameter. Using spectroscopic mapping, we identify a spatially modulated, bias-asymmetric energy gap with a mean-field temperature dependence that serves as an order parameter for the hidden order state.

Work done in collaboration with Y. Huang, A. Pasupathy, J. Mydosh and supported by DOE-BES

Nematic electronic structure in the "parent" state of the iron-based superconductor $Ca(Fe_{1-x}Co_x)_2As_2$

Tien-Ming Chuang, Cornell & National High Magnetic Field Lab, Milan Allan, Cornell & University of St. Andrews, Jinho Lee, Cornell & Brookhaven National Lab, Yang Xie, Cornell, Ni Ni, Sergey Bud'ko, Ames Lab & Iowa State University, Gregory Boebinger, National High Magnetic Field Lab, Paul Canfield, Ames Lab & Iowa State University, J. C. Seamus Davis, Cornell, Brookhaven National Lab & University of St. Andrews

The mechanism of high-temperature superconductivity in the newly discovered iron-based superconductors is unresolved. We use spectroscopic imaging–scanning tunneling microscopy to study the electronic structure of a representative compound $CaFe_{1.94}Co_{0.06}As_2$ in the "parent" state from which this superconductivity emerges. Static, unidirectional electronic nanostructures of dimension eight times the inter–iron-atom distance $a_{Fe\text{-}Fe}$ and aligned along the crystal a-axis are observed. In contrast, the delocalized electronic states detectable by quasiparticle interference imaging are dispersive along the b-axis only and are consistent with a nematic a_2 band with an apparent band folding having wave vector along the a-axis. All these effects rotate through 90 degrees at orthorhombic twin boundaries, indicating that they are bulk properties. As none of these phenomena are expected merely due to crystal symmetry, underdoped ferropnictides may exhibit a more complex electronic nematic state than originally expected [1].
[1] T.-M. Chuang et al, Science 327, 181 (2010).

I14: Valence fluctuations (Sweeney A)

Thursday, 13:30-14:20

Roles of critical valence fluctuations in Ce- and Yb-based heavy fermion metals

Shinji Watanabe and ***Kazumasa Miyake***, Osaka University

Roles of critical valence fluctuations (CVF) in Ce- and Yb-based heavy fermion metals are discussed from a theoretical point of view. It has been recognized gradually [1] that CVF are origin of not only enhanced superconducting transition temperature but also the anomalous properties beyond those of canonical quantum critical point (QCP) on the antiferromagnetic transition. Recently, it turned out that the critical end point of valence transition (CEP-VT) is controlled effectively by applying magnetic field [2], and that the critical valence fluctuations associated with CEP-VT appear more ubiquitously than expected in general [3]. The applied magnetic field induces rather easily the CEP-VT giving rise to a new universality class of QCP around which a metamagnetic behavior is expected. Physical properties around this new QCP enable us to understand anomalous properties of some Ce- and Yb-based compounds [4,5], especially old and new puzzling behaviors of $Ce(Rh,Ir)In_5$ and $YbRh_2Si_2$, and b-$YbAlB_4$.

[1] K. Miyake, J. Phys.: Condens. Matter 19, 125201 (2007).
[2] S. Watanabe, A. Tsuruta, K. Miyake, J. Flouquet, Phys. Rev. Lett. 100, 236401 (2008).
[3] S. Watanabe, A. Tsuruta, K. Miyake, J. Flouquet, J. Phys. Soc. Jpn. 78, 104706 (2009).
[4] S. Watanabe, K. Miyake, J. Phys. Soc. Jpn. 79, 033707 (2010).
[5] S. Watanabe, K. Miyake, preprint.

Crystal-field and Kondo scale investigation of $CeMIn_5$ (M=Co, Ir, and Rh): a combined x-ray absorption and inelastic neutron study

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Linear polarized soft-x ray absorption (XAS) and inelastic neutron scattering (INS) experiments have been performed on $CeMIn_5$ with M = Rh, Ir, and Co to determine the crystal-field scheme and characteristic Kondo

temperature T^* for the hybridization between 4f and conduction electrons [1]. Soft-XAS at the Ce $M_{4,5}$ edges can be used as a complementary technique to neutron scattering since polarization dependent XAS reflects the initial state symmetry and gives thus gives direct information concerning the J_z admixtures of the ground state. In the present work we have determined the ground state wave functions from the polarization dependent soft-XAS data and the crystal-field energies with INS. The characteristic temperature T^* has been determined from the line widths of high resolution INS data and our findings are qualitatively in accordance with the $4f^0$ spectral weights in our XAS data. We further find that the quasielastic line widths of the superconducting compounds $CeCoIn_5$ and $CeIrIn_5$ are comparable with the low energy crystal-field splitting.

[1] T. Willers, Z. Hu, P.O. Körner, J. Gegner, T. Burnus, H. Fujiwara, A. Tanaka, D. Schmitz, H.H. Hsieh, H.-J. Lin, C.T. Chen, E.D. Bauer, J.L. Sarrao, E. Goremychkin, M. Koza, L.H. Tjeng, and A. Severing, to be published

P7: Correlated 4f/5f materials (Sweeney F)

Thursday, 16:45-18:25

Chemical bonding and SCES in intermetallic compounds

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Features of chemical bonding in intermetallic phases play a crucial role for appearance of distinct physical behaviors. Recently this interplay is, in particular, recognized and discussed widely for thermoelectric materials. For design of new strongly correlated electronic systems among intermetallic compounds the understanding of the atomic interactions may open also new opportunities. Especially the covalent interactions between the metal atoms seem to have an effect on physical behavior. New quantum chemical tools based on the electron localizability approach [1,2] allow analysis of the chemical bonding using the electron localizability indicator (ELI-D representation) especially in metallic systems. Decomposition of ELI-D into contributions of the states belonging to certain energy ranges in the electronic density of states [2] allows visualizing and investigation of the role of d and f electrons in the direct bonding in $EuRh_2Ga_8$ [3] and $La_7Os_4C_9$ [4].

[1] M. Kohout, Int. J. Quantum Chem. 97, 651 (2004).
[2] F. R. Wagner et al. Chem. Eur. J. 13, 5724 (2007).
[3] O. Sichevich et al, Inorg. Chem. 48, 6261 (2009).
[4] E. Dashjav et al. J. Solid State Chem. 181, 3121 (2008).

Anisotropic transport in the Kondo insulator $CeRu_4Sn_6$

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In Kondo insulators the hybridization of conduction with f electrons is held responsible for the opening of a narrow energy gap. Of particular interest are compounds where the hybridization vanishes along a symmetry axis of the crystal to produce nodes in the gap [1,2]. First investigations on single crystalline $CeRu_4Sn_6$ have revealed that the magnetization and the specific heat in applied fields are highly anisotropic [3]. Here we present electrical transport measurements and discuss them in the context of previous findings [3-6].

[1] H. Ikeda and K. Miyake, J. Phys. Soc. Jpn. 65, 1769 (1996).
[2] J. Moreno and P. Coleman, Phys. Rev. Lett. 84, 342 (2000).
[3] S. Paschen et al., J. Phys.: Conf. Series 200, 012156 (2010).
[4] I. Das and E.V. Sampathkumaran, Phys. Rev. B 46, 4250 (1992).
[5] E.M. Bruening et al., J. Magn. Magn. Mater. 310, 397 (2007).
[6] A.M. Strydom et al., J. Magn. Magn. Mater. 310, 377 (2007).

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Unconventional magnetism and superconductivity in the ternary actinide compounds $AnPd_5Al_2$

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$AnPd_5Al_2$ compounds (An = rare earths and actinides) crystallize in the tetragonal $ZrNi_2Al_5$-type structure [1-4]. Among them, $NpPd_5Al_2$ is the first Np compound that shows heavy fermion superconductivity [1]. The strongly Pauli-limited upper critical fields (H_{c2}) reflecting the magnetic anisotropy and the first-order phase transition at H_{c2} are very similar characteristics as observed in other heavy fermion supercoductors $CeCoIn_5$ and URu_2Si_2. On the other hand, other isostructural compounds show antiferromagnetic or paramagnetic ground states with a uniaxial magnetic anisotropy along the tetragonal [001] direction. It is remarkable that only Np analogue with a superconducting ground state shows XY-type magnetic anisotropy. Detailed magnetic and superconducting study for these compounds including new experimental developments particularly for the transuranium compounds will be discussed.

[1] D. Aoki et al., J. Phys. Soc. Jpn. 76 (2007) 063701.
[2] Y. Haga et al., J. Alloys Compds. 464 (2008) 47.
[3] K. Gofryk et al., Phys. Rev. B 77 (2008) 092405.
[4] R. A. Ribeiro et al., J. Phys. Soc. Jpn. 76 (2007) 123710.

FRIDAY JULY 02, 2010

7:30-8-30 Complimentary Breakfast

P8: Plenary - 115's **Chair: Yoshichika Onuki** Sweeney F

8:30-9:10 ***Tuson Park***
Quantum criticality in Ce115 compounds

9:10-9:40 ***Pascoal Pagliuso***
Hybridization and low-dimensionality: Key ingredients to find new intermetallic superconductors

9:40-10:10 ***Steffen Wirth***
Magnetotransport and tunneling in heavy fermion metals $CeMIn_5$

10:10-10:40 BREAK

I15: Invited - Quantum criticality: theory **Chair: Thomas Vojta** Sweeney F

10:40-11:10 ***Pinaki Sengupta***
The supersolid phase in quantum magnets

11:10-11:40 ***Hong Liu***
From black holes to strange metals

I16: Invited - Closing Comments **Chair: John Sarrao** Sweeney F

11:40-11:55 ***Zachary Fisk***
Experimental

11:55-12:10 ***Qimiao Si***
Theoretical

P8: 115's (Sweeney F)

Friday, 8:30-10:10

Quantum criticality in Ce115 compounds

Filip Ronning, Vladmir Sidorov, Hanoh Lee, E. D. Bauer, J. L. Sarrao, J. D. Thompson, Los Alamos National Laboratory, ***Tuson Park***, Sungkyunkwan University

Unconventional superconductivity often emerges in the vicinity of a spin-density-type magnetic quantum critical point, suggesting that quantum fluctuations associated with the QCP are responsible for the pairing of superconducting electrons [1]. Lack of superconductivity for some heavy-fermion compounds that were proposed to show local criticality, however, has suggested that local-type quantum fluctuations may not benefit superconductivity [2]. In this talk, we discuss the appearance of isotropic electron scattering in the heavy-fermion compound $CeRhIn_5$ at its pressure-induced QCP, which reflects a local-type QCP. Compared to the normal Fermi liquid state, the resistivity of CeRhIn5 in the quantum critical regime is strongly enhanced by two orders of magnitude [3,4]. The dichotomy between strong electron scattering and maximal superconducting temperature in $CeRhIn_5$ indicates that local quantum fluctuations are responsible for unconventional superconductivity, providing a new route to superconductivity.

[1] Mathur *et al*., *Nature* **394**, 39 (1998); Monthoux *et al*., *Nature* **450**, 1177 (2007).
[2] Gegenwart *et al*., *Nat. Phys*. **4**, 186 (2008).
[3] T. Park *et al*., *Nature* **440**, 65 (2006); T. Park *et al*. *PNAS* **105**, 6825 (2008).
[4] T. Park *et al*., *Nature* **456**, 366 (2008); T. Park *et al*., *New J. Phys*. **11**, 55062 (2009).

Low dimensionality and strong hybridization: key ingredients for finding new intermetallic superconductors

P. G. Pagliuso, Instituto de Física “Gleb Wataghin”, UNICAMP, C.P. 6165, 13083-970, Campinas, Brazil

We discuss pressure –composition phase diagrams for Sn and La-doped $CeRhIn_5$, Sn-doped $CeCoIn_5$, pure and Cd-doped $Ce_2Rh_{1-x}Ir_xIn_8$. Under pressure, we explore the occurrence and pressure dependence of the distinct superconducting phases. The connection of our results to analysis of structurally related intermetallic superconductors such as the FeAs-based compounds, which presents doping and pressure induced superconducting phases allows us to speculate about new routes for finding new superconductors using hybridization and low-dimensionality as the key elements.

Magnetotransport and tunneling in heavy fermion metals $CeMIn_5$

Steffen Wirth, Oliver Stockert, Michael Nicklas, Frank Steglich, MPI for Chemical Physics of Solids, Dresden, Germany, John L Sarrao, Joe D Thompson, Los Alamos National Laboratory, Los Alamos, USA, Andrea D Bianchi, University of Montreal, Zachary Fisk, University of California, Irvine, USA, Andy J Schofield, University of Birmingham, United Kingdom

Heavy fermion metals have advanced to suitable model systems by means of which electronic interactions can be studied in detail. Here we focus on magnetotransport and tunneling investigations of $CeMIn_5$ (M = Co, Ir) and $CeCo(In_{1-x}Cd_x)_5$. Pressure-dependent Hall effect measurements on $CeCoIn_5$ exhibit a well developed feature that can unambiguously be related to spin fluctuations associated with the departure from Landau Fermi liquid behavior. We infer related, yet separate quantum and superconducting critical fields. Magnetotransport measurements on $CeIrIn_5$ indicate a precursor state to superconductivity. A model-independent, single parameter scaling of the Hall angle governed solely by this precursor state is observed. A detailed comparative scaling analysis indicates a weak scattering of the quasiparticles by magnetic excitations. These findings are corroborated

by recent measurements on $CeCo(In_{0.925}Cd_{0.075})_5$, which exhibits local coexistence of antiferromagnetic order and superconductivity. We also report on low temperature Scanning Tunneling Microscopy/Spectroscopy. A gap detected in $CeCoIn_5$ is compatible with $d_{x^2-y^2}$ symmetry of the superconducting order parameter and is, again, consistent with a precursor state to superconductivity.

This work was supported by DFG Research Unit 960, through NSF-DMR-071042 and by the U.S. Department of Energy/Office of Science.

I15: Quantum criticality: theory

Friday, 10:40-11:40

The supersolid phase in quantum magnets

Pinaki Sengupta, Nanyang Technological University, Singapore, Cristian Batista, Los Alamos National Laboratory

While the mechanism for the formation of any possible supersolid phase in solid ^{4}He remains unresolved, theoretical studies have shown that such a phase with simultaneous diagonal and off-diagonal long range order can be stabilized in interacting bosons on a lattice. Motivated by the realization of novel bosonic phases in quantum magnets (e.g., Bose Einstein condensation of magnons), we have extended the idea of the supersolid phase to spin systems. In this talk I describe the charateristic features of the spin supersolid phase and discuss the minimal spin model that can support such a phase. I shall elaborate the mechanism of its formation using analytic results in one dimension and present results for experimentally observable signatures of the phase (e.g., magnetization, static structure factors, and specific heat) from numerical simulations in higher dimensions. Finally, I shall discuss models relevant to real quantum magnets that have a spin supersolid ground state.

From black holes to strange metals

Faulkner Thomas, KITP, Nabil Iqbal, ***Hong Liu,*** John McGreevy, MIT, David Vegh, Stony Brook

Since the mid-eighties there has been an accumulation of metallic materials whose thermodynamic and transport properties differ significantly from those predicted by Fermi liquid theory. Examples of these so-called non-Fermi liquids include the strange metal phase of high transition temperature cuprates, and heavy fermion systems near a quantum phase transition. We report on a class of non-Fermi liquids discovered using gauge/gravity duality. The low energy behavior of these non-Fermi liquids is shown to be governed by a nontrivial infrared (IR) fixed point which exhibits nonanalytic scaling behavior only in the temporal direction. Within this class we find examples whose single-particle spectral function and transport behavior resemble those of strange metals. In particular, the contribution from the Fermi surface to the conductivity is inversely proportional to the temperature. In our treatment these properties can be understood as being controlled by the scaling dimension of the fermion operator in the emergent IR fixed point.

Monday Poster Session 2:30 to 4:45

Poster Numb.	Title	Authors
M001	Thermodynamic properties of the three-band Hubbard model	**Adolfo Avella**, Ferdinando Mancini, and, Francesco Paolo Mancini, Dipartimento di Fisica E.R. Caianiello, Università degli Studi di Salerno
M002	Are linear combinations of Cooper pairs true bosons?	**Carlos Ramirez** and Chumin Wang, Instituto de Investigaciones en Materiales, Universidad Nacional Autonoma de Mexico
M003	Time-resolved spectral function: Electron-phonon coupling in high-T_c superconductors	**Jianmin Tao** and Jian-Xin Zhu, LANL
M004	Vortex structures in gossamer superconductivity	**Masaru Kato**, and Satoshi Tomita, Department of Mathematical Scineces, Osaka Prefecture University, Kazumi Maki, Department of Physics and Astronomy, University of Southern California
M005	Strongly correlated electrons	**Josef Ashkenazi**, University of Miami, Physics Department
M006	The magnetic resonance mode in high-temperature superconductors	**Klaus W. Becker**, Institut für Theoretische Physik, Technische Universität Dresden, Steffen Sykora, Center for Materials Theory, Rutgers University
M007	Dichotomy in the T-linear resistivity in hole-doped cuprates - extended criticality and quasiparticle decoherence	**Nigel E. Hussey**, University of Bristol
M008	Fingerprints of superconducting stripes in hole-doped cuprates	**Ivar Martin**, Theoretical Division, LANL, Christos Panagopoulos, Department of Physics, University of Crete and FORTH, 71003 Heraklion, Greece and Division of Physics and Applied Physics, Nanyang Technological University, 6373616 Singapore
M009	Extinction of quasiparticle scattering interference in kinetic energy driven cuprate superconductors	**Shiping Feng**, Department of Physics, Beijing Normal University, Zhi Wang, Department of Physics, Beijing Normal University, Bin Liu, Department of Physics, Beijing Normal University
M010	Theoretical study of quantum oscillations in thermal conductivity of underdoped YBCO	**Partha Goswami**, D.B.College,University of Delhi, India, Manju Rani, D.B.College,University of Delhi,India, Avinashi Kapoor, Department of Electronic Science,University of Delhi South Campus,India
M011	Enhancement of non-magnetic impurity scattering through enhancement of charge susceptibility around antiferromagnetic criticality in hole-doped cuprate superconductor	**Hiromasa Tamaki**, Osaka University, Kazumasa Miyake, Osaka University
M012	Theory of the collective modes of loop-current order observed underdoped cuprates	**Y. He**, University of California, Riverside, C. M. Varma, University of California, Riverside
M014	Volovik effect in the +/-s-wave state for the iron-based superconductors	**Yunkyu Bang**, Chonnam National University
M015	Model for itinerant magnetism in iron-pnictides	**Vladimir Cvetkovic**, University of California - Riverside, C. M. Varma, University of California - Riverside
M016	Strong correlation and matrix element effects in ARPES and RIXS spectra of cuprates	**Susmita Basak**, Tanmoy Das and Hsin Lin, Northeastern University, J. Nieminen and M. Lindroos, Tampere University of Technology, R.S. Markiewicz, A. Bansil and Susmita Basak, Northeastern University

M017	Contrasting nodal and anti-nodal behavior in the cuprates via ARPES and STM	**Chih-Chun Chien**, LANL, Dan Wulin, University of Chicago, Dirk Morr, University of Illinois at Chicago, Kathryn Levin, University of Chicago
M018	Resonant ultrasound spectroscopy signatures of $YBa_2Cu_3O_{6.5}$ phase diagram in the range 30 K - 310 K.	**Victor R Fanelli**, National High Magnetic Field Laboratory, LANL MPA cmms, Scott C Riggs, and Arkady Shekhter, National High Magnetic Field Laboratory, Tallahassee, FL, Yoko Suzuki, Jon B Betts, Albert Migliori, and Greg S. Boebinger, National High Magnetic Field Laboratory, LANL MPA cmms, Doug Bonn, University of British Columbia, Canada, Walter Hardy, University of British Columbia, Canada, Ruixing Liang, University of British Columbia, Canada
M019	Universal d wave gap shape in the entire doping range of the cuprate high temperature superconductors	**Utpal Chatterjee**, Stephan Rosenkranz and Mike Norman, Argonne National Laboratory, Mohit Randeria, Ohio State University, Juan Carlos Campuzano, Argonne National Laboratory
M020	Cuprate superconductors with applied current, a variational study	**Lilach Goren**, The Weizmann Institute of Science, Ehud Altman, The Weizmann Institute of Science
M021	Pairing by spin fluctuations in electron-doped cuprates	**Kui Jin**, Maryland, Nick Butch, Maryland, Xiaohang Zhang, Maryland, Johnpierre Paglione, Maryland, Richard L Greene, Maryland
M022	High-T_c superconductivity meets a 3+3-dimensional spectroscopy	**J. Lee**, KAIST, Korea and Cornell University, K. Fujita, A. Schmidt, and C.K. Kim, Cornell University, H. Eisaki, AIST, Japan, S. Uchida, University of Tokyo, Japan, J.C. Davis, Cornell University, BNL.
M023	Fermi surface reconstruction and two-carrier modeling of the Hall effect in $YBa_2Cu_4O_8$	**Patrick M. C. Rourke**, and Alimamy F. Bangura, University of Bristol, UK, Cyril Proust and Julien Levallois, Laboratoire National des Champs Magnetiques Intenses, Toulouse, France, Nicolas Doiron-Leyraud, David LeBoeuf and Louis Taillefer, Universite de Sherbrooke, Canada, Seiji Adachi, International Superconductivity Technology Center, Tokyo, Japan, Michael L. Sutherland, University of Cambridge, UK, Nigel E. Hussey, University of Bristol, UK
M024	Instabilities at the Fermi surface of YBCO: the results of a comprehensive quantum oscillation study	**Neil Harrison**, LANL, Suchitra E Sebastian, Cavendish, Cambridge, Paul A Goddard, Clarendon, Oxford, Moaz M Altarawneh and Charles H Mielke, LANL, Ruixing Liang, UBC, Doug A Bonn, UBC, Walter N Hardy, UBC, Ole K Andersen, MPI Stuttgart, Gilbert G Lonzarich, Cavendish, Cambridge
M025	Role of phonons and spin fluctuations in the cuprate high-temperature superconductor Bi-2212	**Elbert E M Chia**, Nanyang Technological University, Jian-Xin Zhu, LANL, Daniel Springer, Nanyang Technological University, Xing Quan Zou, Nanyang Technological University,Saritha nair, Nanyang Technological University, Siew Ann Cheong, Nanyang Technological University, Christos Panagopoulos, Nanyang Technological University, A. J. Taylor, Los Alamos Natioal Laboratory, H Eisaki, AIST, T Tamegai, University of Tokyo, S Uchida, University of Tokyo
M027	Probing order parameters in $La_{2-x}Ba_xCuO_4$ by point-contact spectroscopy	**W. K. Park**, University of Illinois at Urbana-Champaign, E. Fradkin, University of Illinois at Urbana-Champaign, J. S. Wen, Brookhaven National Laboratory, Z. J. Xu, Brookhaven National Laboratory, L. H. Greene, University of Illinois at Urbana-Champaign
M028	Raman crosssection in metallic cuprates	**Arkady Ahekhter**, NHMFL
M029	Magnetic quantum oscillations and multiple holon pockets in underdoped $YBa_2Cu_3O_{6+y}$	**Wei Chen**, University of New South Wales, Oleg P. Sushkov, University of New South Wales, Takami Tohyama, Yukawa Institute for Theoretical Physics

M030	Evolution of Fermi surface in $BaFe_2(As_{1-x}P_x)_2$ revealed by the dHvA effects	**Hiroaki Shishido**, Research Center for Low Temperature and Materials Sciences, Kyoto University, Ali F. Bangura, Amalia I. Coldea
M031	Optical investigation of the charge dynamics in $Ba(Co_xFe_{1-x})_2As_2$	**A. Lucarelli**, ETH Zurich, F. Pfuner, ETH Zurich, J.G. Analytis, Stanford University, J.H. Chu, Stanford University,I.R. Fisher, Stanford University, L. Degiorgi, ETH Zurich
M032	Doping dependent bosonic modes in the high Tc superconductor $Pr_{2-x}Ce_xCuO_{4-\delta}$ from point contact spectroscopy	**Itay Diamant**, Tel-Aviv University,Shay Hacohen-Gourgy, Tel-Aviv university, Yoram Dagan, Tel-Aviv university
M033	X-ray absorption and emission spectroscopy study of the effect of doping on the low energy electronic structure of $PrFeAsO_{1-\delta}$	**Byron Freelon**, UC Berkeley, Y.-S. Liu, Tamkang University, Tamsui, Taiwan, S. D. Wilson and J.-H. Guo, Lawrence Berkeley National Laboratory, Jeng-Lung Chen, Tamkang University, Tamsui, Taiwan, W. Yang, Lawrence Berkeley National Laboratory, C. L. Chang, Tamkang University, Tamsui, Taiwan, P. -A. Glans, Lawrence Berkeley National Laboratory, P. M. Shirage and A. Iyo, NIAIST, Tsukuba, Ibaraki 305-8568, Japan, R. J. Birgeneau, UC Berkeley & Lawrence Berkeley National Laboratory, Berkeley
M034	La doping effects in the coupling between localized and itinerant electronic states in $EuFe_2As_2$ probed by Eu^{2+} ESR	**Fernando A. Garcia**, Eduardo M. Bittar, Cris Adriano, Thales M. Garitezi, Carlos Rettori and Pascoal G. Pagliuso, Inst Fis Gleb Wataghin, CP 6165, Unicamp, Campinas - SP
M035	Point contact Andreev reflection spectroscopic (PCARS) studies of Fe-122 superconductors	**L.H. Greene**, Xin Lu, H.Z. Arhan, C.R. Hunt, and W.K. Park, University of Illinois at Urbana-Champaign, H.Q. Yuan, Zhejiang Univ., China, G.F. Chen, China,G.L. Luo, and N.L. Wang, Chinese Academy of Science, China, A.S. Sefat, M.A. McGuire, R. Jin, B.C. Sales, and D. Mandrus, Oak Ridge National Lab, J. Gillett, Cambridge Univ., UK, S.E. Sebastian, Cambridge Univ., UK
M036	Coherence effect in multiband superconductors: A suggestion of an experiment to determine the correct symmetry of the order parameter	**Keisuke Masuda**, Waseda University, Susumu Kurihara, Waseda University
M037	Magnetic and superconducting orders in iron chalcogenides $Fe_{1+y}Te_{1-x}Se_x$ by point-contact spectroscopy	**W. K. Park**, C. R. Hunt, H. Z. Arham, H. Hu, and J.-M. Zuo, University of Illinois at Urbana-Champaign, Z. J. Xu, J. S. Wen, Z. W. Lin, Q. Li, and G. D. Gu, Brookhaven National Laboratory, L. H. Greene, University of Illinois at Urbana-Champaign
M038	Point contact spectroscopy measurements of superconducting energy gap in Co-doped $BaFe_2As_2$ single crystals	**Pavol Szabó**, Jan Girovský, Zuzana Pribulová, and Tomas Samuely, Centre of Low Temperature Physics at the Institute of Experimental Physics, Slovak Academy of Sciences, Watsonova 47, Košice, Slovakia, Sergey L. Bud'ko and Paul C. Canfield, Ames Laboratory, Iowa State University, Peter Samuely, Centre of Low Temperature Physics at the Institute of Experimental Physics, Slovak Academy of Sciences, Watsonova 47, Košice, Slovakia
M041	Fermi surface of the $LaFe_2P_2$ and $CeFe_2P_2$ pnictides.	**Andrea Bianchi**, Bobby Prévost, Simon Blackburn, Gabriel Seyfarth, and Michel Côté, Université de Montréal, Marek Barkowiak, Oleg Ignatchik, and Jochen Wosnitza, Forschungszentrum Dresden, Roy G. Goodrich, George Washington University, Cigdem Capan and Zachary Fisk, UC Irvine

M042	Pressure and K doping induced superconductivity in $BaFe_2As_2$	**Takehiro Yamazaki**, Department of Physics, Graduate School of Science, Chiba University, Chiba 263-8522, Japan,Nao Takeshita, National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8562, Japan,Ryosuke Kobayashi, Taku Saito, Yuji Yamada, Kenji Kondo, Masanori Hirano, Hideto Fukazawa, and Yoh Kohori, Department of Physics, Graduate School of Science, Chiba University, Chiba 263-8522, Japan,Kunihiro Kihou, Chul-Ho Lee, Hijiri Kito, Akira Iyo, and Hiroshi Eisaki, National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8562, Japan
M044	Neutron and x-ray studies of competing magnetic,structural and superconducting order parameters in $Ba(Fe_{1-x}Co_x)_2As_2$	**Andreas Kreyssig**, Ames Laboratory, Iowa State University, Ames, USA, Dan K. Pratt, Shibabrata Nandi, Rafael M. Fernandes, Min Gyu Kim, Wei Tian, Jerel Zarestky, Alex Thaler, Ni Ni, Sergey L. Bud'ko, Paul C. Canfield, Robert J. McQueeney, Joerg Schmalian, Alan I. Goldman
M045	Spin excitations in Fe-based superconductors	**A. D. Christianson**, Oak Ridge National Laboratory and E. A. Goremychkin, Argonne National Laboratory, M. B. Stone, D. L. Abernathy, S. E. Nagler, G. J. MacDougall and H. A. Mook, Oak Ridge National Laboratory, T. Guidi, ISIS Pulsed Neutron and Muon Facility, C. de la Cruz, Oak Ridge National Laboratory, D. Parshall, K. Lokshin and ,T. Egami, University of Tennessee, M. A. McGuire, A. S. Sefat and B. C. Sales, and D. Mandrus, Oak Ridge National Laboratory
M046	Are the iron pnictides quantum critical?	**Rainer Fromknecht**, Peter Adelmann, Frederic Hardy, Christoph Meingast, Peter Schweiss, Thomas Wolf, Hilbert v. Löhneysen and Rolf Heid, Karlsruhe Institute of Technology, Institute for Solid State Physics, 76021 Karlsruhe, Germany
M047	Competition between Fe-based superconductivity and antiferromagnetism of Eu^{2+} in $Eu_{1-x}Ca_xFe_2As_2$	**Akihiro Mitsuda**, Seike Satoshi, Tomohiro Matoba and Hirofumi Wada, Kyushu University, Fumihiro Ishikawa and Yuh Yamada, Niigata University
M048	Pressure studies on iron-pnictide superconductors: Influence of electronic and structural properties on the superconductivity,	**M. Nicklas**, M. Kumar, E. Lengyel and K. Mydeen, Max Planck Institute for Chemical Physics of Solids
M049	Magnetism and structure evolution in single-crystal $(Ba,Sr,Ca)Fe_2As_2$ solid solutions	**Johnpierre Paglione**, Kevin Kirshenbaum, Nicholas P. Butch and Shanta R. Saha, Center for Nanophysics and Advanced Materials, Department of Physics, University of Maryland, College Park, MD, Peter Y. Zavalij, Department of Chemistry, University of Maryland, College Park, MD, Ben G. Ueland and Jeff W. Lynn, NIST Center for Neutron Research, National Institute for Standards and Technology, Gaithersberg, MD
M050	Relation between superconductivity and tetragonal phase stabilized by uniaxial pressure in $CaFe_2As_2$	**K. Prokes**, Helmholtz-Zentrum Berlin fuer Materialien und Energy, Hahn-Meitner Platz 1, 14109 Berlin, Germany, A. Kreyssig, Ames Laboratory and Iowa State University,, B. Ouladdiaf, Institut Laue-Langevin, 38042 Grenoble Cedex, France, D.K. Pratt, N. Ni, S.L. Bud'ko, P.C. Canfield and R.J. McQueeney, Ames Laboratory and Iowa State University,, D.N. Argyriou, Helmholtz-Zentrum Berlin fuer Materialien und Energy, Hahn-Meitner Platz 1, 14109 Berlin, Germany, A.I. Goldman, Ames Laboratory and Iowa State University,
M051	Evolution of London penetration depth in single crystals of $Ba(Fe_{1-x}T_x)_2As_2$ (T=Co, Ni)	**H. Kim**, R. T. Gordon, N. Ni, M. A. Tanatar, S. L. Bud'ko and C. Canfield, Ames Laboratory and Iowa State University, J. Hua, U. Welp and K. Kwok, Argonne National Laboratory, R. Prozorov, Ames Laboratory and Iowa State University

M052	Neutron-diffraction and heat-capacity measurements on single crystals of the hole-doped $Ba_{1-x}K_xFe_2As_2$	**Norman E Phillips**, Department of Chemistry, University of California, Berkeley and Lawrence Berkeley National Laboratory, Costel R Rotundu, Materials Sciences Division, Lawrence Berkeley National Laboratory, Wei Tian, Department of Physics and Astronomy and Ames Laboratory, Iowa State University, Stephen D Wilson, Physics Department, Boston College, Jerel L Zarestky, Department of Physics and Astronomy and Ames Laboratory, Iowa State University, Robert J Birgeneau, Materials Sciences Division, Lawrence Berkeley National Laboratory, Department of Physics and Department of Materials Science and Engineering, University of California, Berkeley
M053	Field-dependence of competing AFM and SC in underdoped $Ba_{1-x}K_xFe_2As_2$	**R. R. Urbano**, E. Prettner, W. G. Moulton, National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida, A. P. Reyes, P. L. Kuhns, E. M. Bittar, C. Adriano, T. M. Garitezi, L. Bufaiçal and P. G. Pagliuso, Instituto de Física Gleb Wataghin, UNICAMP, 13083-970, Campinas-SP, Brazil
M054	Anisotropic structural and magnetic properties of the field-aligned superconducting system $SmFeAsO_{1-x}F_x$ (x = 0.05, 0.1, 0.2, 0.25, 0.3)	**Y. B. You**, T. K. Hsiao, Taiwan, B. C. Chang, M. F. Tai, Y. Y. Hsu and H. C. Ku, Department of Physics, National Tsing Hua University, Hsinchu 30013, Taiwan, Z. Wei, K. Q. Ruan, X. G. Li, Department of Physics, University of Science and Technology of China, Hefei 230026, China
M055	Magnetic transport properties and superconducting phase diagram of pressure-induced superconductor $EuFe_2As_2$	**Nobuyuki Kurita**, Motoi Kimata, Kota Kodama, Hidetaka Satsukawa, Atsushi Harada, Hiroyuki S. Suzuki and Takehiko Matsumoto, National Institute for Materials Science, Keizo Murata, Division of Molecular Materials Science, Graduate school of Science, Osaka City University, Taichi Terashima, National Institute for Materials Science
M056	Nonlinearity of the current-voltage characteristics for $YBa_2Cu_3O_{7-x}$ singe crystals and the Berezinskii-Kosterlitz-Thouless transition	**Mikhael A. Vasyutin** and Nikolai D. Kuzmichev, Mordovian State University Ruzaevka Machine-building Institute, Lenin St., 93, Ruzaevka, 431440, Russia
M057	Mapping thermal fluctuations in $YBa_2Cu_3O_7$ films with strong mixed pinning landscape	**L. Civale**, MPA-STC, LANL, S.A. Baily, MPA-STC and MPA-CMMS, LANL, H. Zhou, B. Maiorov, T.G. Holesinger, P. Dowden, J. Kennison, N. Haberkorn and M. Miura, MPA-STC, LANL
M058	Isovalent substitutions and heat treatments control of enhanced T_c, chain oxygen order-disorder and AC irreversibility line in HTC superconductors $(Y_{1-x}Sm_x)(SrBa)Cu_3O_{6+z}$	**Abdelhakim Nafidi**, GCMP, University Ibn Zohr Morocco
M059	The magnetic field induced resistive vortex state in an underdoped high T_c cuprate	**Scott C Riggs**, Oskar Vafek and Jon Kemper, NHMFL, FSU, Jon Betts, Albert Migliori and Ross McDonald, NHMFL, LANL, Ruixing Liang, Walter Hardy and Doug Bonn, UBC, Greg Boebinger, NHMFL, FSU
M060	Pure and Co-doped $BaFe_2As_2$ single crystals grown from different fluxes: a comparison study	**Cris Adriano**, Eduardo M. Bittar, Thales M. Garitezi, Leandro F. Bufaiçal and Rogerio L. de Almeida, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Campinas - SP - Brazil, Raquel A. Ribeiro and Marcos A. Avila, Centro de Ciências Naturais e Humanas, Universidade, Ricardo R. Urbano, National High Magnetic Field Laboratory, Florida State University, 32306-4005, Tallahassee, FL, USA, Pascoal G. Pagliuso, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Campinas - SP – Brazil
M061	Fe pnictides in high magnetic fields	**Fedor Balakirev**, LANL

M062	Traces of superconductivity in Li-doped $BaFe_2As_2$ single crystals	**Thales M. Garitezi**, Cris Adriano, Rógerio L. de Almeida, Eduardo M. Bittar, Leandro F. Bufáiçal and Pascoal G. Pagliuso, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas UNICAMP, Campinas, São Paulo, Brazil
M063	Gap structure in $Ba(Fe_{1-x}Co_x)_2As_2$ superconductor probed by low-temperature specific heat	**K. Gofryk**, LANL, A. S. Sefat, M. A McGuire, B. C. Sales and D. Mandrus, ORNL, J. D. Thompson, E. D. Bauer and F. Ronning, LANL
M064	Thermodynamic investigations of the doping and pressure dependences of the electronic density of states and the superconducting gaps in the electron-doped iron pnictide $Ba(Fe_{1-x}Co_x)_2As_2$	**Frédéric Hardy**, Thomas Wolf, Peter Schweiss, Peter Adelmann and Doris Ernst, Karlsruher Institut für Technologie, Institut für Festkörperphysik, 76021 Karlsruhe, Germany, Robert A. Fisher, Lawrence Berkeley National Laboratory, Berkeley CA 94720. USA, Robert Eder, Rolf Heid, Hilbert v. Löhneysen and Christoph Meingast, Karlsruher Institut für Technologie, Institut für Festkörperphysik, 76021 Karlsruhe, Germany
M065	Superconductivity of $Sr(Ni_xPd_{1-x})_2Ge_2$	**Y. Y. Hsu**, Taiwan, C. D. Yang, H. C. Hsu and W. Y. Tseng, Department of Physics, National Taiwan Normal University, Taipei 11677, Taiwan, H. C. Chen and H. C. Ku, Department of Physics, National Tsing Hua University, Hsinchu 30013, Taiwan, M. N. Ou and Y. Y. Chen, Institute of Physics, Academia Sinica, Taipei 11529, Taiwan
M066	Pulsed field transport and thermoelectric properties of single crystal $NaFe_{0.95}Co_{0.05}As$ and $NaFeAs_{0.8}P_{0.2}$	**Marcelo Jaime**, MPA-CMMS, LANL, Los Alamos, NM 87545, USA., Adam Aczel, Dep. of Phys. & Astron., McMaster University, Hamilton, ON, Canada, Yoshimitsu Kohama and Scott Baily, MPA-CMMS, LANL, Graeme Luke, Dep. of Phys. & Astron., McMaster University, Hamilton, ON, Canada, Genfu Chen and Weiqiang Yu, Dep. of Phys., Renmin University of China, Beijing 100872, China
M067	High critical currents and strong pinning in low anisotropy $BaCo_xFe_{2-x}As_2$ thin films due to naturally grown correlated defects	**B. Maiorov**, MPA-STC, LANL, T. Katase, Materials and Structures Laboratory, Tokyo Institute of Technology, Japan, H. Hiramatsu, Frontier Research Center, Tokyo Institute of Technology, Japan, L. Civale, MPA-STC, LANL, S.A. Baily, MPA-CMMS and MPA-STC, LANL, T.G. Holesinger, MPA-STC, LANL, H. Hosono, Materials and Structures Laboratory and Frontier Research Center, Tokyo Institute of Technology, Japan,
M068	High magnetic field scales and nearly isotropic critical currents in SmFeAs(O,F)	**Philip J.W. Moll**, ETH Zurich, Roman Puzniak, Polish Academy of Sciences, Fedor Balakirev, LANL, Krzysztof Rogacki, Polish Academy of Sciences, Janusz Karpinski, Nikolai D. Zhigadlo and Bertram Batlogg, ETH Zurich
M069	Surprising two-dimensionality: surface superconductivity in undoped iron arsenides	**J. S. Kim**, E. G. Kim, and T. D. Blasius, University of Florida, T. Vojta, Missouri University of Science and Technology, G. R. Stewart, University of Florida
M070	Local properties of Sr_2AO_3FeAs oxypnictides (A=Sc, V)	**Julian Andres Munevar Cagigas**, Dalber Sanchez Candela and Mariella Alzamora Camarena, Centro Brasileiro de Pesquisas Fisicas, Xiyu Zhu and Hai-Hu Wen, National Laboratory for Superconductivity, Institute of Physics, and Beijing National Laboratory for Condensed Matter Physics, Chinese Academy of Sciences, Elisa Baggio Saitovitch, Centro Brasileiro de Pesquisas Fisicas
M071	Effect of non-magnetic impurity Zn on superconductivity in LaFeAsO	**Yuke Li**, Xiao Lin, Jun Tong, Han Han, Guanghan Cao and Zhu-an Xu, Zhejiang University, Fuchun Zhang, The University of Hong Kong
M072	Magnetic relaxation studies on $FeTe_{0.60}Se_{0.40}$ superconductor	**C. S. Yadav** and P. L. Paulose, Tata Institute of Fundamental Research, Mumbai, India

M073	Unusual electronic properties of iron pnicitdes in extremely high magnetic fields	**Huiqiu Yuan** and Jiao Lin, Department of Physics, Zhejiang University, John Singleton and F. F. Balakirev, LANL, Jiangping Hu, Department of Physics, Purdue University, Linjun Li, Guanghan Cao and Zhuan Xu, Department of Physics, Zhejiang University, Haihu Wen, Institute of Physics, Chinese Academy of Science
M074	Measurements of the in-plane London penetration depth and superfluid density as a function of doping level in the $Ba(Fe_{1-x}Co_x)_2As_2$ series	**Ryan Gordon** and Hyunsoo Kim, Ames Laboratory and Iowa State University, Nicholai Salovich and Russell Giannetta, University of Illinois at Urbana-Champaign, Makariy Tanatar, Vladimir Kogan, and Ruslan Prozorov, Ames Laboratory and Iowa State University
M075	Electronic and thermal transport properties of Ni-based superconductors	**Nobuyuki Kurita**, National Institute for Materials Science, Filip Ronning, Corneliu. F. Miclea, Yoshi Tokiwa and Eric. D. Bauer, LANL, Alaska Subedi and David J. Singh, Oak Ridge National Laboratory, Joe D. Thompson and Roman Movshovich, LANL
M076	Ce f-electron Kondo effect in the P- and F-doped CeFeAsO	**Jianhui Dai**, Zhejiang University, Jian-Xin Zhu, LANL, Qimiao Si, Rice University
M078	Inelastic neutron scattering investigation of the molecular-orbit formation in Li_2RuO_3	**D.T. Adroja**, ISIS Facility, STFC Rutherford Appleton Laboratory, Chilton, Didcot, Oxfordshire, OX11 0QX, UK, V.V. Krishnamurthy, University of Tennessee, Martin-Ripley Center, Ripley, TN 38063, USA, P. Manuel, ISIS Facility, STFC Rutherford Appleton Laboratory, UK, A. Daoud-Aladine, ISIS Facility, STFC Rutherford Appleton Laboratory, UK, M.R. Lees, Department of Physics, Warwick University, UK, Junghwan Park, and J.-G. Park, Department of Physics & Astronomy, Center for Strongly Correlated Materials Research, Seoul National University, Korea, S. Nagler, Oak Ridge National Laboratory
M079	Low-temperature elastic properties of non-Kramers doublet compound $PrMg_3$	**Koji Araki**, Graduate School of Science and Technology, Niigata University, Japan, Keisuke Mitsumoto and Yuichi Nemoto, Graduate School of Science and Technology, Niigata University, Niigata, Japan, Hiroyuki S. Suzuki, National Institute for Materials Science, Tsukuba, Japan, Hiroshi Tanida, Graduate School of Advanced Sciences of Matter, Hiroshima University, Higashi-Hiroshima, Japan, Shigeru Takagi, Physics Department, Graduate School of Science, Tohoku University, Sendai, Japan, Shadi Yashin, Sergei Zherlitsyn and Joachim Wosnitza, Dresden High Magnetic Field Laboratory, Forschungszentrum Dresden-Rossendorf, Dresden, Germany, Terutaka Goto, Graduate School of Science and Technology, Niigata University, Japan
M080	Magnetoelectric behavior of Cr-trimer complexes: Unexpected charge effects in Mott insulators	**O.E. Ayala-Valenzuela**, R.D. McDonald, M.C. Gurak, P. Sengupta, C. Batista and M. Jaime, LANL, B. Mallick and A-V. Mudring, Ruhr-University Anorganische Chemie, Bochum, German, J.A. Mydosh, Kamerlingh Onnes Laboratory, Leiden University, The Netherlands
M081	On the physical properties of the double layer perovskite $CeBaFe_2O_{5+w}$	**Rogério L. de Almeida**, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas, Mirella L. Altoé, Universidade de Brasília, , Oscar F. de Lima, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas
M082	Nonlinear conductivity of electronic origin in magnetic oxides: uncommon cases at E < 1000 V/cm	**Bertina Fisher**, Jan Genossar, Larisa Patlagan, Irena Feldman and George M. Reisner, Dept. of Physics, Technion, Haifa, Israel
M084	Magnetic and dielectric phase diagrams of multiferroic $Tb_{1-x}Eu_xMnO_3$ ($0 < x < 1$),	**Y. Y. Hsu**, H. C. Hsu, C. D. Yang, H. C. Chen and W. Y. Tseng, Department of Physics, National Taiwan Normal University, Taipei 11677, Taiwan, H. C. Ku, Department of Physics, National Tsing Hua University, Hsinchu 30013, Taiwan

M085	Elastic modulus of cage compound $PrRu_2Zn_{20}$	**Isao Ishii**, Yasuhiko Suetomi, Takahiro Fujita, Takahiro Onimaru, Keisuke Matsumoto, Yukihiro F. Inoue, Toshiro Takabatake, Hirosand Takashi Suzuki, Hiroshima University
M086	Spontaneous strain in ferroquadrupolar phase of $TmAu_2$	**Masashi Kosaka**, Yutaka Shida, Ami Imanari and Susumu Katano, Graduate School of Science and Engineering, Saitama University, Saitama 338-8570, Kenji Ohoyama, Institute for Materials Research, Tohoku University, Sendai 980-8577, Hideya Onodera, Department of Physics, Tohoku University, Sendai 980-8578
M088	Femtosecond optical spectroscopy in $LuFe_2O_4$	**J. Lee**, and D. Talbayev, Center for Intergrated Nanotechnologies, LANL, C. L. Zhang, Center for Emergent Material, Department of Physics and Astronomy, Rutgers University, X. S. Xu, Department of Chemistry, University of Tennessee, S.-W. Cheong, Center for Emergent Material, Department of Physics and Astronomy, Rutgers University, A. J. Taylor and R. P. Prasankumar, Center for Intergrated Nanotechnologies, LANL
M089	Magnetism of multiferroic Eu_YMnO_3 studied by ^{151}Eu Mossbauer spectroscopy	**F. Jochen Litterst**, IPKM, TU Braunschweig, Germany, Alexander Krimmel, Exp. Physik V, Univ. Augsburg, Germany, Marius Grothe, IPKM, TU Braunschweig, Germany, Alois Loidl, Exp. Physik V, Univ. Augsburg, Germany
M090	Effect of sizes-reduction on the charge ordering of $Nd_{0.5}Sr_{0.5}MnO_3$	**Sourav Kundu**, Tapan Kumar Nath and Arghya Taraphder, IIT Kharagpur
M091	Magnetic and orbital order in $FeCr_2S_4$ studied by Mossbauer spectroscopy	**Josefin Engelke** and F. Jochen Litterst, IPKM, TU Braunschweig, Germany, Friedrich E. Wagner, and G. Michael Kalvius, Phys. Dept. TU München, Germany, Alexander Krimmel and Alois Loidl, Exp. Phys. V, Univ. Augsburg, Germany
M092	First-order like antiferromagnetic transition in rare-earth palladium bronze $SmPd_3S_4$	**Eiichi Matsuoka**, Department of Physics, Graduate School of Science, Kobe University, Masanori Watahiki, and Masahito Sakota, Department of Physics, Graduate School of Science, Kobe University, Takahiro Sakurai, Center for Supports to Research and Education Activities, Kobe University, Hitoshi Sugawara, Department of Physics, Graduate School of Science, Kobe University, Hitoshi Ohta, Molecular Photoscience Research Center, Kobe University, Hideya Onodera, Department of Physics, Graduate School of Science, Tohoku University
M093	NMR studies of metal-insulator transition in the spinel-type $Cu(Ir_{1-x}V_x)_2S_4$	**Haruo Niki**, Hiroyuki Okuda, Yuki Okada, Ken Higa, Nana Fukuyoshi, Ran Mahoe, Morihito Oshiro, Mamoru Yogi and Katsuma Yagasaki, Department of Physics, Faculty of Science, University of the Ryukyus, Nishihara, Okinawa 903-0213, Japan, Yuusuke Kawashima and Shoichi Nagata, Materials Science of Engineering, Muroran Institute of Technology, Muroran, Hokkaido 050-8585, Japan
M094	Signature of phase coexistence in over doped manganite	**R. Bindu**, Ganesh Adhikary, Kalobaran Maiti
M095	Charge, spin and orbital order in the CE phase of quasi-cubic manganites	**P. Schlottmann**, Florida State University
M096	Theory of unconventional charge ordering and electrical transport in Skutterudite $PrRu_4P_{12}$	**Ryosuke Shiina**, Dept. of Materials Science and Technology, Niigata University,Niigata 950-2181, Japan
M097	Fermi liquid versus spin liquid and spin-singlet states in frustrated Vanadium Oxides	**Yasuhiro Shimizu**, Institute for Advanced Research, Nagoya University, Hikaru Takeda and Masayuki Itoh, Department of Physics, Nagoya University, Seiji Niitaka and Hidenori Takagi, RIKEN, Masahiro Isobe and Yutaka Ueda, ISSP, University of Tokyo

M098	Magnetic frustration effect in the multi-band vanadate NaV_2O_4	**Hikaru Takeda**, Department of Physics, Graduate School of Science, Nagoya University, Hiroya Sakurai, National Institute for Materials Science, Masayuki Itoh, Department of Physics, Graduate School of Science, Nagoya University
M099	Variational Monte Carlo study of two-dimensional strong spin-orbit coupling system: Novel Mott insulating state in Ir Oxide,	**Hiroshi Watanabe**, Tomonori Shirakawa and Seiji Yunoki, Computational Condensed Matter Physics Laboratory, RIKEN ASI, Saitama 351-0198, Japan, and CREST, Japan Science and Technology Agency (JST), Tokyo 102-0075, Japan,
M100	Elastic constants of filled Skutterudite $LaRu_4As_{12}$	**Tatsuya Yanagisawa**, Hiroyuki Hidaka and Hiroshi Amitsuka, Hokkaido University, Sapporo, Japan, Tomasz Cichorek and Zygmunt Henkie, Polish Academy of Sciences, Wrocław, Poland, M. Brian Maple, University of California San Diego, La Jolla, USA
M101	A new first principles DFT+U method for electronic structure study of strongly correlating electron systems	**Tomoyuki Hamada** and Masahiko Ichimura, Advanced Research Laboratory, Hitachi Ltd. and JST-CREST, Sadamichi Maekawa, Institute of Material Science, Tohoku University and JST-CREST
M102	Low-temperature phase separation of excitonic gas and strong-bound electron-hole liquid in self-doped manganites	**Fedor N. Bukhanko**, Donetsk Phys.-Techn. Institute NASU
M103	Phonon Raman scattering of YB_6	**Hisamitsu Bando**, Takumi Hasegawa and Norio Ogita, Graduate School of Integrated Arts & Sciences, Hiroshima University, Fumitoshi Iga, Graduate Scholl of Advanced Sciences of Matter, Hiroshima University, Masayuki Udagawa, Graduate School of Integrated Arts & Sciences, Hiroshima University
M104	Quantum phase transition in the 2D spin-dimmer system $SrCu_2(BO_3)_2$	**Julio Antonio Larrea Jimenez** and Silke Paschen, Institute of Solid State Physics, Vienna University of Technology, Austria, Henrik Ronnow, Julian Piatek, Mohamed Zayed and Mark de Vires, Laboratory for Quantum Magnetism, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland, Rolf Lortz, Hong Kong University of Science and Technology, Christian Ruegg, London Center for Nanotechnology, University College London
M105	Spin excitations in the coupled two-leg spin ladder $Bi(Cu_{1-x}Zn_x)_2PO_6$ (x=0 and 0.03)	**D.T. Adroja**, ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon, OX11 0QX, M. Skoulatos, 2Helmholtz Centre Berlin for Materials and Energy, Lise-Meitner-Campus, Hahn-Meitner-Platz 1, 14109, Berlin, Germany, B. Koteswararao, Department of Physics, Indian Institute of Technology Bombay, Mumbai 400076, India, M. Koza, Institute of Laue- Langevin BP 156, 6 Rue Jules Horowitz 38042, Grenoble Cedex, France, A.V. Mahajan, Department of Physics, Indian Institute of Technology Bombay, Mumbai India, K. Habicht and B. Lake, Helmholtz Centre Berlin for Materials and Energy, Lise-Meitner-Campus, Hahn-Meitner-Platz 1, 14109, Berlin, Germany, C. Geibel and R. Nath, MPI for Chemical Physics of Solids, Dresden, Germany, E. Kemmer, Helmholtz Centre Berlin for Materials and Energy, Lise-Meitner-Campus, Berlin, Germany, J. Bobroff, Laboratoire de Physique des Solids, Universite Paris-Sud, France

M106	Non-linear spin dynamics on the square lattice: neutron scattering and theory	**Martin Mourigal**, Institut Laue Langevin, Grenoble, France, Niels B Christensen, Materials Research Division, Risø DTU, Technical University of Denmark, Roskilde, Denmark, Gøran J Nilsen and Henrik M Rønnow, Laboratory for Quantum Magnetism, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland, Mechthild Enderle, Institut Laue Langevin, Grenoble, France, Philip Tregenna-Piggott, Laboratory for Neutron Scattering, ETH Zurich and PSI, Villigen, Switzerland, Des F McMorrow, Department of Physics and Astronomy, University College of London, UK, Franz Demmel, Rutherford Appleton Laboratory, ISIS Facility, Didcot, UK, Martin Boehm, Institut Laue Langevin, Grenoble, France, Andrew Harrison, Institut Laue Langevin, Grenoble, France
M107	AC heat capacity and magnetocaloric effect of $Sr_3Cr_2O_8$ and $RbFe(MoO_4)_2$ in pulsed magnetic fields	**Yoshimitsu Kohama**, MPA-CMMS, LANL, Christophe Marcenat, Département de Recherche Fondamentale sur la Matière Condensée, Commissariat à l'Energie Atomique, 17 Avenue des Martyrs, Grenoble France, Thierry Klein, Département de Recherche Fondamentale sur la Matière Condensée, Commissariat à l'Energie Atomique, Grenoble France, Marcelo Jaime, MPA-CMMS, LANL
M108	A numerical study for two-dimensional spin 1/2 antiferromagnets: a generalization of Entanglement perturbation theory to two-dimensional lattices	**Lihua Wang**, Tomonori Shirakawa, Computational Condensed Matter Physics Laboratory, RIKEN ASI, Japan; CREST, Japan Science and Technology Agency (JST), Japan, Sung Gong Chung, Department of Physics and Nanotechnology Research and Computation Center, Western Michigan University, Kalamazoo, Michigan 49008, USA, Seiji Yunoki, Computational Condensed Matter Physics Laboratory, RIKEN ASI, Saitama 351-0198, Japan; CREST, Japan Science and Technology Agency (JST), Japan,
M109	Frustration-induced multiferroic behavior in organo-metallics	**V. S. Zapf**, National High Magnetic Field Laboratory, Los Alamos National Lab, M. Kenzelmann, Paul Scherrer Institute, Villigen, Switzerland, F. Wolff-Fabris, now at Dresden Hochfeld Labor, Dresden, Germany, F. Balakirev, National High Magnetic Field Laboratory, LANL, Y. Chen, NIST center for neutron research, U. Maryland College Park
M110	Ultrasound investigations of some frustrated and low-dimensional magnets	**Sergei Zherlitsyn**, Dresden High Magnetic Field Laboratory, Forschungszentrum Dresden-Rossendorf, Germany, Olivio Chiatti, London Centre for Nanotechnology, University College London, Arina Sytcheva, Joachim Wosnitza, Dresden High Magnetic Field Laboratory, Forschungszentrum Dresden-Rossendorf, Germany, Andrei A. Zvyagin, Verkin Institute for Low Temperature Physics and Engineering, Ukraine
M111	Fermionic cluster glass model in a transverse field	**F. M. Zimmer**, C. F. Silva and S. G. Magalhaes, Universidade Federal de Santa Maria
M112	A simple model for magnetoelectric interaction in multiferroics	**Cesar J. Calderon Filho** and E. Barberis, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas, São Paulo, Brazil
M113	Magnetic properties of geometrically frustrated polymorphic crystals of $Cu_{4-x}Mg_x(OH)_6Cl_2$ (x~1)	**Shaoyan Chu**, CMSE, Massachusetts Institute of Technology
M114	Spin freezing in geometrically frustrated $Tb_2Mo_2O_7$ studied with high resolution neutron scattering and a.c. susceptibility	**Jason Gardner**, Indiana University and NIST, Georg Ehlers, SNS, Oak Ridge Nat. Laboratory, Cris Adriano, Unicamp, Brazil, John Greedan, McMaster University, Canada

M115	Long-time variation of magnetic structure in rare-earth intermetallic compounds	**Kiyoichiro Motoya**, Tokyo University of Science, Taketo Moyoshi, Tokyo University of Science, Toru Shigeoka, Yamaguchi University
M116	Long-time variation of magnetic structure in $Ca_3Co_2O_6$	**Taketo Moyoshi**, Tokyo University of Science, Rui Takahashi, Tokyo University of Science, Kiyoichiro Motoya, Tokyo University of Science
M117	Coexisting magnetic order and cooperative paramagnetism in the stuffed Pyrochlore $Tb_{2+x}Ti_{2-2x}Nb_xO_7$	**Benjamin G. Ueland**, LANL, Jason S. Gardner, NIST Center for Neutron Research, Anthony J. Williams, Princeton University, Maria L. Dahlberg, The Pennsylvania State University, Jae G. Kim, Princeton University, Yiming Qiu, NIST Center for Neutron Research, John R. D. Copley, NIST Center for Neutron Research, Peter Schiffer, The Pennsylvania State University, Robert J. Cava, Princeton University
M118	Component-separated magnetic transition in $HoRh_2Si_2$ single crystal	**Toru Shigeoka**, Testuya Fujiwara and Hiroshi Shibasaki, Yamaguchi University, Kazuyuki Matsubayashi and Yoshiya Uwatoko, University of Tokyo
M119	Quantum criticality in frustrated Kondo lattice $Pr_2Ir_2O_7$	**J. G. Donath**, L. O. Pedrero and M. Brando, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany, P. Gegenwart, 1. Physikalisches Institut, Universität Göttingen, Göttingen, Geramny, F. Steglich, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany, Y. Machida, and Nakatsuji, Institute for Solid State Physics, University of Tokyo, Kashiwa, Japan, J. Donath, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany
M120	Geometrical frustration, heavy fermions, and lattice disorder in uranium intermetallics	**Yu Jiang**, Chemical Sciences Division, Glenn T. Seaborg Center, Lawrence Berkeley National Laboratory, Corwin H. Booth, Chemical Sciences Division, Glenn T. Seaborg Center, Lawrence Berkeley National Laboratory, Paul H. Tobash, Department of Chemistry and Biochemistry University of Delaware, Krzysztof Gofryk, Filip Ronning, Eric Bauer and Joe D. Thompson, Materials Physics and Application Division, MPA-10, LANL
M121		**{Withdrawn}**
M122	Polarized superfluid state in a fermionic optical lattice	Akihisa Koga, Tokyo Institute of Technology, Philipp Werner, ETH Zurich
M123	Quantum phases of Bose-Fermi mixtures in optical lattices	**Kazuto Noda** and Norio Kawakami, Kyoto Univ., Robert Peters, Univ. Göttingen, Thomas Pruschke, Univ. Göttingen
M124	Functional renormalization group approach to the 3D interacting Bose gas	**Daniel Reyes**, International Institute of Physics, Nils Hasselmann, International Institute of Physics
M125	Stability of superflow in supersolid phases of lattice bosons with dipole-dipole interaction	**Daisuke Yamamoto**, Waseda University, Ippei Danshita, Tokyo University of Science
M126	Three-component repulsive fermionic atoms in optical lattice	**Seiichiro Suga**, University of Hyogo, Kensuke Inaba, NTT Basic Research Laboratories and JST, CREST
M127	Color superfluidity and trionic state of three-component lattice fermionic atoms	**Shin-ya Miyatake**, Osaka University, Kensuke Inaba, NTT Basic Research Laboratories and JST, CREST, Seiichiro Suga, University of Hyogo
M128	Quantum quenches in a XXZ spin chain from a spatially inhomogeneous initial state,	**Jarrett Lancaster**, New York University, Aditi Mitra, New York University
M129	Concomitant FFLO states in polarized atomic gases	**C. J. Bolech**, Univ. of Cincinnati, L. O. Baksmaty, Rice University, H. Pu, Rice University, H. Lu, Rice University,

M130	Measuring universal quantum critical behavior in cold atomic systems	**Kaden R. A. Hazzard**, Cornell University, Erich J. Mueller, Cornell University
M132	Normal and superconducting properties of a 2-dimensional extended one-band Hubbard model	**E. J. Calegari** and S. G. Magalhaes, Universidade Federal de Santa Maria, E. S. Caixeiro, C. M. Chaves and A. Troper, Centro Brasileiro de Pesquisas Fisicas,
M133	Angular dependent magnetoresistance and magnetization measurements in $La_{0.7}Ca_{0.3}MnO_3/YBa_2Cu_3O_{7-\delta}/La_{0.7}Ca_{0.3}MnO_3$ hybrids	**Carmen C. Almasan**, Tao Hu and Hong Xiao, Kent State University, C. Visani, and Santamaria, Universidad Complutense de Madrid
M134	Pressure tuned quantum criticality in the non-fermi liquid system FeCrAs	**Fazel Fallah Tafti**, Wenlong Wu, and Stephen R Julian, University of Toronto

Tuesday Poster Session 2:30 to 4:45

Poster Numb.	Title	Authors
Tu001	Magnetic structure of Cd-doped $Ce_2Rh_{0.5}Ir_{0.5}In_8$ determined by neutron magnetic scattering	**Cris Adriano**, Carlos Giles, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Campinas - SP - Brazil, William Ratcliff, Jeffrey W. Lynn , NIST Center for Neutron Research, Gaithersburg, Maryland, Zachary Fisk, University of California, Irvine, Pascoal G. Pagliuso, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Campinas - SP - Brazil
Tu002	Inelastic neutron scattering study of spin gap formation in $YbAl_3C_3$	**D.T. Adroja**, ISIS Facility, STFC Rutherford Appleton Laboratory, UK, .A. McEwen, London Centre for Nanotechnology, and Department of Physics and Astronomy, University College London, M. Kosaka, Department of Physics, Saitama University, Japan, A.D. Hillier, ISIS Facility , STFC Rutherford Appleton Laboratory, UK, J.-G. Park, Department of Physics & Astronomy, Center for Strongly Correlated Materials Research, Seoul National University, , K. Kondo, Department of Physics, Saitama University, Japan, J. Taylor and R. Stewart, ISIS Facility , STFC Rutherford Appleton Laboratory, UK, P.S. Riseborough, Department of Physics, Temple University
Tu003	Neutron study of crystal field excitations in single crystal $CeCu_2Ge_2$	**Michael Loewenhaupt**, IFP, TU Dresden, Enrico Faulhaber and Astrid Schneidewind, PANDA, HZB, Micha Deppe, MPI_CPfS, Klaudia Hradil, IPC, U Goettingen
Tu004	Specific heat of a $CeCu_{0.7}Al_{3.3}$ single crystal	**Petr Cermak**, Pavel Javorský, and Klára Uhlířová, Charles University in Prague
Tu005	MuSR measurements on $CeAl_3$ under pressure at very low temperatures	**Jorge L. Gavilano**, Lab. for Neutron Scattering, ETHZ & PSI, Hans R. Ott, Lab. Solid State Physics, ETHZ, Rustem Kasanov and Alexander Maisuradze, Lab. for Muon spin Spectroscopy, PSI, Daniel Andreica, Babes-Bolyai Univ, Douglas E. MacLaughli, Univ. of California, Oscar O. Bernal, California State Univ.
Tu006	Competition between disorder and volume variation in $Ce_y(La_{1-z}Y_z)_xPd_2Al_3$	**Antônio Neto Medina**, Departamento de Física, Universidade Estadual de Maringá - UEM, Av. Colombo 5790, 87020-900, Maringá, PR, Brazil, Ricardo Donizeth dos Reis, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, 13083-970, Campinas, SP, Brazil, Luzeli Moreira da Silva, and Adenilson Oliveira dos Santos, Centro de Ciências Sociais, Saúde e Tecnologia, Universidade Federal do Maranhão - UFMA, Brazil, Lisando Pavie Cardoso and Flávio Cesar Guimarães Gandra, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - Brazil.
Tu007	Magnetic phase transitions in CePtSn under high Pressure	**A.M. Alsmadi**, The Hashemite University, Jordan, M. Torikachvili, San Diego State University, K. Kothapalli, F. Nasreen and H. Nakotte, New Mexico State University
Tu008	Evidence for ferromagnetic order in $YbCu_2Si_2$ at high pressure	**Daniel Braithwaite**, Amalia Fernandez-Panella, Bernard Salce, Gérard Lapertot and Tatsuma Matsuda, INAC/SPSMS CEA-Grenoble, Jacques Flouquet, INAC/SPSMS CEA-Grenoble
Tu009	Effects of pressure on incommensurate-commensurate magnetic phase transitions in UPd_2Si_2	**Hiroyuki Hidaka**, Atsushi Tanaka, Hideki Igarashi, Tatsuya Yanagisawa and Hiroshi Amitsuka, Hokkaido University

Tu010	Magnetic and transport properties of CeT_2Al_{10} (T = Fe, Ru, Os) under pressure	**Yukihiro Kawamura**, Faculty of Science, Kochi University, Yuta Ogane, Faculty of Science, Kochi University, Tomoaki Takesaka, Faculty of Science, Kochi University, Takashi Nishioka, Faculty of Science, Kochi University, Harukazu Kato, Faculty of Science, Kochi University, Masahiro Matsumura, Faculty of Science, Kochi University, Kazuyuki Matsubayashi, Institute for Solid State Physics, University of Tokyo, Yoshiya Uwatoko, Institute for Solid State Physics, University of Tokyo
Tu011	Electrical resistivity of UNiGa under high hydrostatic pressures	**Martin Míšek**, Jan Prokleška, Jiří Pospíšil and Vladimír Sechovský, Charles University, Faculty of Mathematics and Physics, DCMP, Prague, Czech Rep., Jiří Kamarád, Institute of Physics, Academy of Sciences of the Czech Rep
Tu012	Structural instability of unfilled skutterudite compounds TSb_3 (T=Co, Rh and Ir) under high pressure	**Kazuki Matsui**, Junichi Hayashi, Keita Akahira, Kojiro Ito, Keiki Takeda, and Chihiro Sekine, Muroran Institute of Technology
Tu013	Low pressure phase diagram of $CeCoGe_3$	**Masakazu Mizoo**, Takashi Nishioka, Harukazu Kato, and Masahiro Matsumura, Kochi University
Tu014	Effect of pressure on the superconducting temperature of Cerium metal	**Gendo Oomi** and Tatsuya Kawae, Kyushu university, Masashi Ohashi, Kanazawa university
Tu015	$CeCu_2Si_2$: new insights from magneto-transport measurements at ambient and under high pressure	**Kausik Sengupta**, Anna-Sabina Rüetschi, Ernest-Ansermet, Gabriel Seyfarth and Didier Jaccard, DPMC, University of Geneva, Switzerland
Tu016	Pressure effects on the magnetic transition of high-quality $CeAuSb_2$	**Soonbeom Seo**, Department of Physics, Sungkyunkwan University, Suwon, South Korea, Hanoh Lee, LANL, , Tuson Park, Department of Physics, Sungkyunkwan University, Suwon South Korea, Z Fisk, Department of Physics and Astronomy, University of California at Irvine, Joe D. Thompson, LANL,
Tu017	Effect of pressure on transport properties of $CeTIn_5$ (T=Co, Rh, Ir)	**Yoshinao Takaesu**, Yuuki Tamaki, Tomotaka Nakatani, Naofumi Aso, Masato Hedo and Takao Nakama, Faculty of Science, University of the Ryukyus, Kazuhiko Deguchi and Noriaki K. Sato, Graduate School of Sciences, Nagoya University
Tu018	Fermi surface evolution of a heavy fermion superconductor into an antiferromagnet state: de Haas-van Alphen measurements on Cd-substitutions for In in $CeCoIn_5$	**Roy G. Goodrich**, George Washington University, Cigdem Capan, Zachary Fisk, Andrea Bianchi and L.D. Pham, University of California Irvine, John DiTusa, David Young, Illia Vekhter, Julia Chan and J. Y. Cho, Louisiana State University, Luis Balicas, Y-J Jo, and Timothy P. Murphy, National High Magnetic Field Laboratory, Florida State University
Tu020	The crystal growth and physical properties of $CeRh_{1-x}Pd_xIn_5$	**Marie Kratochvílová**, Klára Uhlířová, Jan Prokleška and Vladimír Sechovský, Department of Condensed Matter Physics, Faculty of Mathematics and Physics, Charles University in Prague
Tu021	Dilute La-substitutions in $CeRhIn_5$ studied by means of NMR/NQR techniques	**Hironori Sakai**, LANL, ASRC, Seung -H. Baek, Nobuyuki Kurita, Corneliu F. Miclea, Roman Movshovich, Filip Ronning, Eric D. Bauer and Joe D. Thompson, LANL
Tu022	Superconductivity and non-Fermi-liquid behavior in $Ce_{1-x}Yb_xCoIn_5$	**L. Shu**, E. Gonzales, K. Huang and T. A. Sayles, University of California, San Diego, J. Paglione, University of Maryland, J. O'Brien, Quantum Design, R. E. Baumbach, J. J. Hamlin and D. A. Zocco, University of California, San Diego, P.-C. Ho, California State University,Fresno, C. A. McElroy and M. B. Maple, University of California, San Diego
Tu023	Physical properties of $Ce_2Rh_{1-x}Pd_xIn_8$	**Klára Uhlířová**, Marie Kratochvílová, Jan Prokleška and Vladimír Sechovský, Charles University in Prague

Tu024	Electron spin resonance of Er^{3+} in the antiferromagnetic heavy fermion system $CeIn_{3-x}Cd_x$	**Eduardo M. Bittar**, UNICAMP, Brazil, Cigdem Capan, UC Irvine, Cris Adriano, and Carlos Rettori, UNICAMP, Brazil, Saul B. Oseroff, SDSU, Zachary Fisk, UC Irvine, , Pascoal G. Pagliuso, UNICAMP, Brazil
Tu025	Study of the magnetic properties of $Ce_{1-x}Yb_xIn_3$ single-crystals	**Ricardo Donizeth dos Reis**, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Brazil, George Dourado Loula, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Brazil, Luzeli Moreira da Silva, Centro de Ciências Sociais, Saúde e Tecnologia, Universidade Federal do Maranhão - UFMA, R. Urbano Santos, Brazil., Adenilson Oliveira dos Santos, Centro de Ciências Sociais, Saúde e Tecnologia, Universidade Federal do Maranhão - UFMA, R. Urbano Santos, Brazil, Antônio Neto Medina, Departamento de Física, Universidade Estadual de Maringá - Brazil, Lisando Pavie Cardoso, Flávio Cesar Guimarães Gandra, Instituto de Física Gleb Wataghin, Universidade Estadual de Campinas - UNICAMP, Brazil
Tu026	De Haas -van Alphen Effect Study on the Antiferro-Quadrupolar Ordering in $PrPb_3$	**Toshiyuki Isshiki**, Noriaki Kimura and Haruyoshi Aoki, Tohoku University, Japan, Hiroyuki Suzuki, NIMS, Japan
Tu027	Evolution of Fermi surface properties in $CeRu_2(Si_{1-x}Ge_x)_2$ studied via transport and dHvA effect measurements	**Haruyoshi Aoki**, Kosuke Aoki, Yuji Matsumoto, Yasunobu Shimizu, and Noriaki Kimura, Tohoku University, Taichi Terashima and Shinnya Uji, National Institute for Materials Science
Tu028	DHvA effect study on the f electron nature in $Ce_xLa_{1-x}Ru_2Si_2$	**Yuji Matsumoto**, Noriaki Kimura and Haruyoshi Aoki, Graduate School of Science and Center for Low Temperature Science, Tohoku University, Motoi Kimara, Institute for Solid State Physics, University of Tokyo, Taichi Terashima, Shinya Uji, National Institute for Materials Science
Tu029	A comparitive study on the crystal field levels in CeT_2Ge_2 (T = Cu, Au and Ag)	**Devang A Joshi**, Ruta Kulkarni, Sudesh Kumar Dhar and Thamizhavel Arumugam, Tata Institute of Fundamental Research, Mumbai India
Tu030	Complex magnetic order in $CeAu_2Ge_2$	**Veronika Fritsch**, Gerda Fischer, Germany, Wolfram Kittler, Peter Pfundstein and Hilbert v. Löhneysen, Karlsruhe Institute of Technology, Germany
Tu032	Magnetic-field-driven metal-insulator transition in $CeOs_4As_{12}$,	**Tomasz Cichorek**, Łukasz Bochenek, Ryszard Wawryk and Zygmunt Henkie, Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wrocław, Poland, Ryan E. Baumbach and M. Brian Maple, Department of Physics and Institute for Pure and Applied Physical Sciences, University of California, San Diego,
Tu033	De Haas-van Alphen effect in $SmOs_4P_{12}$	**Yoshichika Onuki** and Rikio Settai, Osaka University, Hitoshi Sugawara, Eiichi Matsuoka, Masahito Sakoda and Shuhei Tanaka, Kobe University
Tu034		**{Withdrawn}**
Tu035	Novel electronic order with staggered Kondo and crystalline electric field (CEF) singlets: possible model for $PrFe_4P_{12}$	**Shintaro Hoshino**, Junya Otsuki and Yoshio Kuramoto, Tohoku University
Tu036	Effective-low energy model for f-electron delocalization	**Khaled Al-Hassanieh**, Yi-feng Yang, Ivar Martin, and Cristian Batista, LANL
Tu037	Coexistence of ferromagnetism and superconductivity: a DMRG study of an extended Periodic Anderson Model with attractive interaction	**Pedro R. Bertussi**, and Raimundo R. dos Santos, Universidade Federal do Rio de Janeiro

Tu038	The S=1 underscreened Anderson Lattice model for Uranium compounds	**Christopher Thomas**, Acirete S. da Rosa Simoes and J. R. Iglesias, Instituto de Fisica, Universidade Federal do Rio Grande do Sul, Brazil, C. Lacroix, Institut Néel, CNRS-UJF, Grenoble, France, N. B. Perkins, Department of Physics, University of Wisconsin-Madison, , B. Coqblin, L. P. S., Université Paris-Sud, France
Tu039	Global phase diagram and Berry phase effects in Kondo lattice systems	**Pallab Goswami**, Rice University, Qimiao Si, Rice University
Tu040	Electronic hybridization effects in dense intermetallics measured by electron spin resonance	**Vladimir A. Ivanshin** and Tatiana O. Litvinova, Kazan State University, Russia
Tu041	A Kondo cluster-glass model for spin glass Cerium alloys	**Sergio G. Magalhaes** and Fabio M. Zimmer, Dep. de Física, Universidade Federal de Santa Maria, Brazil , Bernard Coqblin, L. P. S., Université Paris-Sud, Orsay, France
Tu042	Kondo resonance narrowing in d- and f-electron systems	**Andriy Nevidomskyy**, Rutgers University, Piers Coleman, Rutgers University
Tu043	What makes a Kondo insulator/semiconductor?	**Jozef Spalek**, Institute of Physics, Jagiellonian University, Krakow, Poland, Andrzej Slebarski, Institute of Physics, Univesity of Silesia, Katowice, Poland
Tu044	Possible Fermi-surface deformation in mixed-valence system	**Takashi Sugibayashi** and Hiroaki Kusunose, Ehime Univerisity
Tu045	Kondo effect of magnetic ion vibrating in a cage potential	**Satoshi Yashiki**, Shunsuke Kirino, and Kazuo Ueda, Institute for Solid State Physics, University of Tokyo
Tu046	Heavy electron phenomenology	**Yi-feng Yang**, LANL
Tu047	Low energy properties of the two-impurity Anderson model	**Lijun Zhu** and Jian-Xin Zhu, LANL
Tu049	Probing the single-ion physics in $(U,Th)Ru_2Si_2$	**Premala Chandra**, Anna Toth, Piers Coleman, Rutgers University, Hiroshi Amitsuka, Hokkaido University
Tu050	Quantum size effects on mixed-valence compound $CePd_3$,	**Yi Hsin Lin**, Academia Sinica, Chong Li Dong, National Synchrotron Radiation Research Center, Sin Hang Wu, Yang Yuan Chen and Min-Nan Ou, Academia Sinica
Tu051	Huge first order metamagnetic transition in the heavy fermion system CeTiGe	**Micha Deppe**, Stefan Lausberg, Franziska Weickert, Manuel Brando, Nubia Caroca-Canales, Christoph Geibel, Max Planck Institute for Chemical Physics of Solids, Germany, Julian G. Sereni, Lab. Bajas Temperaturas, Centro Atómico Bariloche (CNEA), 8400 S. C. de Bariloche, Argentina, Frank Steglich, Max Planck Institute for Chemical Physics of Solids, Germany
Tu052	Band renormalization and self-energy in correlated f-electron systems	**Tomasz Durakiewicz**, Yinwan Li, and Peter S. Riseborough, Temple University, Peter M. Oppeneer, Uppsala University, John J. Joyce, Eric D. Bauer, and Kevin S. Graham, LANL
Tu053	Evidence of dynamical spin shielding in Ce from spin-resolved photoelectron spectroscopy	**JG Tobin** and S-W Yu, LLNL, T Komesu, Missouri Inst.Sci. Tech, BW Chung, and SA Morton, LLNL, GD Waddill, Missouri Inst.Sci. Tech
Tu054	Observation of unusual Kondo resonance using high resolution photoemission spectroscopy	**Kalobaran Maiti**, Swapnil Patil and Ganesh Adhikary, Department of Condensed Matter Physics and Materials Science, Tata Institute of Fundamental Research, Mumbai, India., Geetha Balakrishnan, Department of Physics, University of Warwick, UK.

Tu055	Soft x-ray angle-resolved photoemission study of $YbCu_2Ge_2$	**Akira Yasu**, Shin-ichi Fujimori, Ikuto Kawasaki, Tetsuo Okane, Yukiharu Takeda and Yuji Saitoh, Japan Atomic Energy Agency, Hiroshi Yamagami, Kyoto Sangyo University, Akira Sekiyama and Rikio Settai, Osaka University, Tatsuma Matsuda and Yoshinori Haga, Japan Atomic Energy Agency, Yoshichika Onuki, Osaka University, Shin-ichi Fujimori, Japan Atomic Energy Agency
Tu056	MuSR studies of the heavy fermion $CeRhSi_3$	**Nikola Egetenmeyer**, Simon Gerber and Jorge Gavilano, ETH Zurich and Paul Scherrer Institut, Switzerland, Michel Kenzelmann, Paul Scherrer Institut, Switzerland, Gabriel Seyfarth, Université de Genève, Switzerland, Alexander Maisuradze, University of Zurich and Paul Scherrer Institut, Switzerland, Rustem Khasanov and Christopher Baines, Paul Scherrer Institut, Switzerland, Alexandre Desilets-Benoit and Andrea Bianchi, Université de Montréal, Canada, Douglas MacLaughlin, University of California Riverside
Tu057	Fermi surface in $CeCoSi_3$	**Noriaki Kimura**, Hiroki Iida, Yuka Kadota, Mayuko Kogure and Haruyoshi Aoki, Tohoku University
Tu058	Successive magnetic transition in non-centrosymmetric $CeCoGe_3$ probed by Co-NQR	**Masahiro Matsumura**, Yusuke Sato, Masakazu Mizoo, Yukihiro Kawamura, Harukazu Kato, and Takashi Nishioka, Graduate School of Integrated Arts and Sciences, Kochi University, Japan
Tu059	Itinerant magnetism, Kondo-effect and crystal-field splitting in $CeNi_{9-x}Fe_xGe_4$ ($0 \le x \le 1$)	**Christian Gold**, Ludwig Peyker and Ernst-Wilhelm Scheidt, Institut für Physik, Universität Augsburg, Germany, Herwig Michor, Institut für Festkörperphysik, Technische Universität Wien, Austria, Wolfgang Scherer, Institut für Physik, Universität Augsburg, Germany,
Tu060	Low temperature phase of YbPd investigated by Raman scattering	**Takumi Hasegawa** and Norio Ogita, Hiroshima University, Masaki Sugishima, Akihiro Mitsuda and Hirofumi Wada, Kyusyu University, Masayuki Udagawa, Hiroshima University
Tu061	Magnetic and transport properties of RT_2Al_{20} (R = rare earth, T= transition metal, x=V, Cr, Nb)	**Ryuji Higashinaka**, Akihiro Nakama, Makoto Ando, Makoto Watanabe, Yuji Aoki and Hideyuki Sato, Tokyo Metropolitan University
Tu062	Formation of the pseudogap in $CeFe_2Al_{10}$ probed by ^{27}Al-NQR	**Yukihiro Kawamura**, Shingo Edamoto, Tomoaki Takesaka, Takashi Nishioka, Harukazu Kato and Masahiro Matsumura, Faculty of Science, Kochi University
Tu063	Substitution effect of $CeRu_2Al_{10}$ single crystals	**Riki Kobayashi**, Yukihiro Kawamura, Takashi Nishioka, Harukazu Kato, Masahiro Matsumura, Faculty of Science, Kochi University, Kazuyuki Matsubayashi and Yoshiya Uwatoko, Institute for Solid State Physics, University of Tokyo, Masafumi Sera, Department of Quantum Matter, ADSM, Hiroshima University
Tu064	Metamagnetic anomaly in a hidden ordered state of $CeOs_2Al_{10}$	**Yuji Muro**, Junpei Kajino, Kazunori Umeo and Toshiro Takabatake, ADSM, Hiroshima University
Tu065	Magnetic properties of $Ce(Ru_{1-x}Fe_x)_2Al_{10}$	**Takashi Nishioka**, Daishi Hirai, Yukihiro Kawamura, Harukazu Kato and Masahiro Matsumura, Kochi University, Kazuyuki Matsubayashi and Yoshiya Uwatoko, University of Tokyo
Tu066	Thermal and magnetic properties of a low-temperature antiferromagnet $Ce_4Pt_{12}Sn_{25}$	**Roman Movshovich**, Nobuyuki Kurita and Han-Oh Lee, LANL, Pei-Chun Ho, California State University, Fresno, M. Brian Maple, University of California, San Diego, Yoshifumi, Tokiwa, Corneliu F. Miclea, Eric D. Bauer, Filip Ronnin and Pinaki Sengupta, LANL, Ilya Vekhter, Louisiana State University, Zachary Fisk, University of California, Irvine, Joe D. Thompson, LANL

Tu067	Magnetic order in a heavy fermion state of $Yb^{2+}_{1-x}Tm_xB_6$	**Fumitoshi Iga**, Kenji Fukuta, Shinji Michimura, Takahiro Onimaru, Hiroshi Tanida, , Masafumi Sera and Yoshio Takahashi, Grad. School of Science, Hiroshima University, Higashi-Hiroshima 739-8520, Japan, Kazunori Umeo, N-BARD, Hiroshima University, Higashi-Hiroshima 739-8530, Japan, Toshiro Takabatake, Grad. School of Advanced Sciences of Matter & IAMR, Hiroshima University, Higashi-Hiroshima 739-8530, Japan
Tu068	NMR study of half-Heusler compound YbPtSb	**Takehide Koyama**, Maiko Abe, Takeshi Mito, Ko-ichi Ueda and Takao Kohara, University of Hyogo, Hiroyuki S. Suzuki, National Institute for Materials Science,
Tu070	Transport and magnetic properties of new heavy-fermion antiferromagnet $YbNi_3Al_9$	**Shigeo Ohara**,Youichi Mori, Tetsuro Yamashita, and Isao Sakamoto, Nagoya Institute of Technology
Tu071	Competing magnetic interactions in $CeNi_{9-x}Co_xGe_4$	**Ludwig Peyker**, Christian Gold and Ernst-Wilhelm Scheidt, CPM, Department of Physics, University of Augsburg, Herwig Michor, Institute of Solid State Physics, Vienna University of Technology, Wolfgang Scherer, CPM, Department of Physics, University of Augsburg
Tu072	Heat capacity and magnetic phase diagram of the hydride CeRuSiH	**J. Rodríguez Fernández** and Rojas, Citimac, Facultad de Ciencias, Universidad de Cantabria, Spain, E. Gaudin and France, B. Chevalier, CNRS, Université de Bordeaux, France
Tu073	Hidden magnetic precursor in the first order ferromagnetic transition of $CeIn_2$	**Daniel Rojas Pupo**, Jose Ignacio Espeso Martinez, Jesus Rodriguez Fernandez and Jose Carlos Gomez Sal, University of Cantabria
Tu074	Low temperature magnetic properties of $Pr(Cu,Ga)_{12.85}$	**Yasuyuki Shimura**, Toshiro Sakakibara and Kentarou Kuga, Institute for Solid State Physics, University of Tokyo, Kashiwa 277-8581, Japan, Jung Young Cho and Julia Y. Chan, Department of Chemistry, Louisiana State University
Tu075	Magnetic and electrical properties of the $U_2(Pd_{1-x}Co_x)_2Sn$ system	**Paul de V. du Plessis**, University of Johannesburg; University of the Witwatersrand, Johannesburg, Andre M. Strydom, University of Johannesburg, Moise B. Tchoula Tchokonte, University of the Western Cape
Tu076	Low-temperature antiferromagnetic ordering in the heavy-fermion metal YbPd	**Yoshi Tokiwa**, Stefanie Grünheit, Christian Stingl, Hirale S. Jeevan and Philipp Gegenwart, I Physikalisches Institut, Georg-August Universitaet Goettingen
Tu077	Antiferromagnetic fluctuation rates in the Kondo compound CeTSn (T=Pd, Pt) from Mossbauer spectroscopy	**Polikarpov Mikhail**, Chuev Mikhail and Cherepanov Valeriy, Russian Research Center Kurchatov Institute
Tu078	Heavy-fermion phenomena as a crystal-field effect	**R. J. Radwanski**, Center of Solid State Physics, Poland, Institute of Physics, Pedagogical University, Poland
Tu079	Effective low energy model for f-electron delocalization	**Yi-feng Yang**, Khaled A. Al-Hassanieh, Ivar Martin, and Cristian D. Batista, LANL
Tu080	A unified explanation of the Kadowaki-Woods ratio in strongly correlated metals	**A. C. Jacko**, J. O. Fjaerestad, and B. J. Powell, University of Queensland
Tu081	Synthesis and characterization of the double-perovskite series $Sr_{2-x}La_xFeIrO_6$	**Leandro Bufaiçal** and Cris Adriano, UNICAMP, Raimundo Lora-Serrano, UFU, Pascoal G. Pagliuso, UNICAMP
Tu082	Strategy for study of critical behavior with high-resolution thermal expansion: application to Antiferromagnetic transition of Bi_2CuO_4	**Benjamin D White**, Welm M Pätzold, and John J Neumeier, Montana State University

Tu083	Magnetic phases and metal-insulator transition in the double-chain compound, $Ca_{1-x}Na_xV_2O_4$	**Hiroya Sakurai**, National Institute for Materials Science
Tu084	Physical properties in ternary lanthanide phosphide RRu_2P_2 (R = La, Ce, Pr and Eu) with $ThCr_2Si_2$-type structure	**Kenji Kanto**, Yamaguchi University, Kazuyuki Matsubayashi and Yoshiya Uwatoko, University of Tokyo, Toru Shigeoka andTetsuya Fujiwara, Yamaguchi University
Tu085	Strong coupling of different magnetic and structural phases in doped $CeFe_2$ compounds	**Arabinda Haldar** and K. G. Suresh, Indian Institute of Technology Bombay, India, A. K. Nigam, Tata Institute of Fundamental Research, Mumbai, India
Tu086	New intermetallic MIrP (M=Ti, Zr, Nb, Mo) and MgRuP compounds related with MoM'P (M'=Ni and Ru) superconductor	**Hijiri Kito**, Akira Iyo and Toshimi Wada, National Institute of Advanced Industrial Science and Technology (AIST)
Tu087	Tuning of 221 compounds by hydrogen absorption	**Ladislav Havela**, Charles University, Khrystyna Miliyanchuk, Ivan Franko National University of Lviv, Ukraine, Oleksandr Kolomiyets and Stanislav Danis, Charles University, Heinrich Nakotte and Anna Llobet-Megias, LANSCE, LANL, Silvie Maskova, Charles University
Tu088	Superconductivity, heavy-fermion behavior, and structural phase transitions in caged compounds RT_2Zn_{20} (R=La, Pr, T=Ru, Ir)	**Takahiro Onimaru**, Keisuke T Matsumoto, Yukihiro F Inoue, Kazunori Umeo and Yuta Saiga, Hiroshima University, Yoshitaka Matsushita, NIMS, Ryuji Tamura and Kazue Nishimoto, Tokyo University of Science, Isao Ishi, Takashi Suzuki and Toshiro Takabatake, Hiroshima University
Tu089	Magnetic properties of nanocrystalline $FeTe_{1-x}Se_x$ system	**P.L. Paulose** and C.S. Yadav, Tata Institute of Fundamental Research
Tu090	$ThPt_3B$, a novel superconductor in actinoid platinum metal borides	**Peter F Rogl**, Institute of Physical Chemistry, University of Vienna, Ernst Bauer, Institute of Solid State Physics, Vienna University of Technology, Raimund Podloucky, Institute of Physical Chemistry, University of Vienna, Esmaeil Royanian and Heinrich Kaldarar, Institute of Solid State Physics, Vienna University of Technology, Austria, Ernst-Wilhelm Scheid, Chemische Physik und Materialwissenschaften, Universitaet Augsburg, Germany, Herwig Michor, Institute of Solid State Physics, Vienna University of Technology, Austria, Oksana Sologub and Antonio Goncalves, Dept. Quimica ITN/CFMUL, Sacavem, Portugal
Tu091	Raman study of crystal electric field excitations in $PrRu_4P_{12}$	**Norio Ogita** and Takumi Hasegawa, Graduate School of Integrated Arts and Sciences, Hiroshima University, Hitoshi Sugawara, Faculty of Integrated Arts and Sci., The University of Tokushima, Hideyuki Sato
Tu092	Synthesis and properties of the filled skutterudite $SmPt_4Ge_{12}$	**Walter Schnelle**, Roman Gumeniuk, Andreas Leithe-Jasper, Helge Rosner, Michael Nicklas, Michael Schoeneich, Marcus Schmidt, Ulrich Schwarz and Yuri Grin, Max Planck Institute for Chemical Physics of Solids
Tu093	Magnetic properties of new filled skutterudite compound $GdFe_4As_{12}$ and $TbFe_4As_{12}$	**Chihiro Sekine**, Graduate School of Engineering, Koujiro Ito and Kazuki Matsui, Graduate School of Engineering, Muroran Institue of Technology, Takehiko Yagi, Institute for Solid State Physics, University of Tokyo
Tu094	Novel magnetic behavior of $GdPd_2Si_2$ single cryatal	**Toru Shigeoka**, Testuya Fujiwara, Kenji Kantou and Ya Heng Zhang, Yamaguchi University, Yoshiya Uwatoko, University of Tokyo

Tu095	Low-temperature magnetic structure of UCuSn under hydrostatic pressure	**Karunakar Kothapalli**, New Mexico State University, Sven C Vogel, Hongwu Xu and Qiang Wei, Los Alamos Neutron Science Center, Ekkehard Brück, an der Waals-Zeeman Instituut, Heinz Nakotte, New Mexico State University
Tu096	Evolution of the B-T phase diagram in $UAs_{1-x}Se_x$	**Marcin Matusiak**, Tomasz Plackowski and Józef Sznajd, ILT&SR PAS
Tu097	Single crystal growth and physical properties of ternary uranium compounds UM_2Al_{10}(M=Fe, Ru and Os),	**Takashi Sugai**, Depertment of Physics, Tohoku University, Yoshinori Haga, Etsuuji Yamamoto and Naoyuki Tateiwa, Advanced Science Research Center, Japan Atomic Energy Agency
Tu098	RF skin depth measurement of UIrGe in high magnetic fields	**Farzana Nasreen** and Karunakar Kothapalli, New Mexico State University, Moaz Mohammad Altarawneh, LANL, Neil Harrison, NHMFL, Pulse Field Facility, LANL, Heinrich Nakotte, New Mexico State University, Ekkehard Bruck, Van der Waals-Zeeman Institute, Universiteit van Amsterdam, Amsterdam
Tu099	Effect of martensitic transition on magnetic, transport and thermal properties of $Ni_{45}Co_5Mn_{38}Sb_{12}$ Heusler alloy	**Ajaya K. Nayak**, IIT Bombay, A.K. Nigam, TIFR, K.G. Suresh, IIT Bombay
Tu100	Synthesis, crystal structure, and physical properties of the new antiferromagnetic UIr_4Al_{15} compounds	**Paul H Tobash**, Filip Ronning, Joe D Thompson and Eric D Bauer, LANL
Tu101	Chemical composition dependence of the superconducting properties in $YbGa_xSi_{2-x}$	**Naohito Tsujii** and Motoharu Imai, NIMS, Tsukuba, Japan, Hitoshi Yamaoka, RIKEN, Harima Institute, Japan, Takao Furubayashi and Hideaki Kitazawa, NIMS, Tsukuba, Japan
Tu102	Research on mechanism of magnetism in Vanadium-Benzene cluster	**Hironobu Yamaguchi**, Hiroyasu Matsuura, Shinji Watanabe and Kazumasa Miyake, Osaka University
Tu103	Magnetic and thermal properties of cubic $SmCu_4X$ compounds (X = Ag, Au and Pd)	**Shuai Zhang**, Takashi Tayama, Toshio Mizushima, Tomohiko Kuwai and Yosikazu Isikawa, University of Toyama, Japan
Tu104	Magnetic transition and unconventional antiferromangetic spin fluctuations in heavy-fermion compound Yb_3Pt_4	**S. Zhao**, J. M. Mackie and D. E. MacLaughlin, University of California, Riverside, O. O. Bernal, California State University, Los Angeles, CA 90032, C. Marques, Y Janssen and M. C. Aronson, Brookhaven National Laboratory
Tu105	Magnetostriction quantum oscillations in semimetallic GdSb up to 50T	**Ramzy Daou**, MPI-CPfS, Ariane Haase, TU Dresden, Mathias Doerr, TU Dresden, Franziska Weickert, MPI-CPfS, Michael Nicklas, MPI-CPfS, Frank Steglich, MPI-CPfS
Tu107	Magnetic structure of Dy_2CoGa_8 determined by x-ray resonant magnetic scattering	**Carlos Giles**, Jose R. L. Mardegan, Cris Adriano and Pascoal G. Pagliuso, UNICAMP
Tu108	The pressure effect on transport and magnetic properties of $Nd_{1x}Tb_xCo_2$	**Kiyoharu Uchima** and Yoshinao takaesu, General Education, Okinawa Christian Junior College, Shouta Yonamine, Atsushi Kinjyo, Masato Hedo and Katsuma Yagasaki, Faculty of Science, University of the Ryukyus , Yoshiya Uwatoko, Institute for Solid State Physics, University of Tokyo, Alexander T. Burkov, A. F. Ioffe Physico-Technical Institute, Russian Academy of Sciences

Tu109	Electric current-induced dimer hopping in $CuIr_2S_4$	**Shikou Notsu** and Masato Hedo, Faculty of Science, University of the Ryukyus, Kiyoharu Uchima, Okinawa Christian Junior College, Takao Nakama, Faculty of Science, University of the Ryukyus, Shouichi Nagata, Department of Materials Science and Engineering, Muroran Institute of Technology, Hironobu Fujii, Faculty of Integrated Arts and Science, Hiroshima University, Alexander T. Burkov, A. F. Ioffe Physical-Technical Institute, Katsuma Yagasaki and Masato Hedo, Faculty of Science, University of the Ryukyus
Tu110	Valence transitions and nanoscale Kondo-like behavior in Yb organometallic molecules	**Corwin H. Booth**, Lawrence Berkeley National Laboratory, Daniel Kazhdan and Evan Werkema, Lawrence Berkeley National Laboratory and University of California, Berkeley, Marc D. Walter and Wayne W. Lukens, Lawrence Berkeley National Laboratory, Eric D. Bauer, LANL, Yung-Jin Hu and Laurent Maron, Lawrence Berkeley National Laboratory and University of California, Berkeley, Odile Eisenstein, Universite Montpellier, Martin Head-Gordon, Lawrence Berkeley National Laboratory and University of California, Berkeley, Richard A. Andersen, Lawrence Berkeley National Laboratory and University of California, Berkeley
Tu111	Thermoelectric transport through strongly correlated quantum dots	**Theodoulos A. Costi** and Veljko Zlatic, Research Centre Juelich
Tu113	Correlation effects on the crossed Andreev reflection through a quantum dot	**Yasuhiro Yamada**, Department of Physics, Kyoto University, Yoichi Tanaka, Condensed Matter Theory Laboratory, RIKEN, Norio Kawakami, Department of Physics, Kyoto University
Tu114	CT-QMC and maximum entropy approach to a scattering-states formulation of strongly correlated steady-state transport	**Andreas Dirks**, Institute of Theoretical Physics, University of Goettingen, Philipp Werner, Institute of Theoretical Physics, ETH Zurich, Mark Jarrell, Department of Physics and Astronomy, Louisiana State University, Thomas Pruschke, Institute of Theoretical Physics, University of Goettingen
Tu115	Numerical analysis of the two-level SU(2) regime in carbon nanotubes: a quantum phase transition?	**George B. Martins** and Carlos A. Busser, Oakland University - USA, Pedro Orellana, Universidade Catolica del Norte - Chile, Edson Vernek, Universidade Federal de Uberlandia - Brasil, Gustavo A. Lara , Universidade De Antofagasta - Chile, Eugene H. Kim, University of Windsor - Canada, Enrique V. Anda, Pontificia Universidade Catolica do Rio de Janeiro - Brasil
Tu116	Optical absorption of strongly correlated quantum dot in the Kondo regime	**Partha Goswami**, D.B.College,University of Delhi, India, Ajay Pratap Singh, D.B.College,University of Delhi,India, Avinashi Kapoor, Department of Electronic Science,University of Delhi South Campus,India
Tu117	Application of Dirac's constraints to correlated electrons and confined geometries	**David Schmeltzer**, CCNY
Tu118	Semi-classical limit of the effective interaction potential for electrons in a high Landau level	**Orion Ciftja** and Brittney Cornelius, Department of Physics, Prairie View A&M University, Texas
Tu119	Thermal transport in the Quasi-one-dlmensional Luttinger liquid candidate, $Li_{0.9}Mo_6O_{17}$	**J. L. Cohn**, University of Miami, C. A. M. dos Santos, M. S. da Luz and J. J. Neumeier, Montana State University
Tu120	Magnetism in quasi-one-dimensional Co perovskites	**Mariella Alzamora**, Dalber R. Sanchez and Elisa M Baggio-Saitovitxh, CBPF, Rio de Janeiro, Brazil, F. Jochen Litterst, IPKM, TU Braunschweig, Braunschweig, Germany

Tu122	Reversible switching of magnetic transitions in Na_xCoO_2 (x = 0.83) by altering the Coulomb potential background	**Jakob Kanter**, Laboratory for Solid State Physics, Zurich, Switzerland, Christof Niedermayer, Denis Sheptyakov, Laboratory for Neutron Scattering, Paul Scherrer Institut, Villigen, Switzerland, Kurt Mattenberger and Bertram Batlogg, Laboratory for Solid State Physics, Zurich, Switzerland
Tu123	^{13}C NMR and resistivity measurements of charge glass state in a charge-frustrated organic conductor	**Kazuya Miyagawa**, Yuta Muto, Motomune Kodama, Yoshihiro Shimada and Kazushi Kanoda, University of Tokyo
Tu124	Photoexcited states in charge ordered insulators -$(BEDT\text{-}TTF)_{2X}$ and dimmer Mott insulators -$(BEDT\text{-}TTF)_{2X}$	**Tokio Tatsumi**, Graduate School of Materials Science Nara Institute of Science and Technology (NAIST)
Tu125	Optical properties across metal-insulator transition in $(SrMnO_3)_n/(LaMnO_3)_{2n}$ superlattice	**Andrea Perucchi** and Leonetta Baldassarre, Sincrotrone Trieste, Alessandro Nucara, and Paolo Calvani, Universita Sapienza, Carolina Adamo and Darrell Schlom, Cornell University, Luigi Maritato, Universita di Salerno, Stefano Lupi, Universita Sapienza
Tu127	Manifestation of the transition semiconductor-semimetal and correlation between band structure and magneto- transport properties in II-VI infrared detector nanostructure superlattice	**Abdelhakim Nafidi**, GCMP, University Ibn Zohr Morocco
Tu128	Optical conductivity and superconductivity in the highly anisotropic compound $LaSb_2$	**D. van der Marel**, Universite Geneve, Switzerland, J. Y. Chan, P. W. Adams, D. P. Young and S. Guo, Louisiana State University, V. Guritanu, Universite Geneve, Switzerland, J. F. DiTusa, Louisiana State University
Tu129	Observation of the surface state and fractional Landau quantization in a topological insulator	**Ross D McDonald**, LANL James G Analytis, Stanford University, Oscar A Valenzuela, LANL Scott C Riggs, Florida State University, Jiun-Haw Chu, Stanford University, Moaz M Altarawneh, LANL Gregory S Boebinger, Florida State University, Ian R Fisher, Stanford University
Tu130	Study of electron sub-band spectrum in magnetic field for a quantum well	**Partha Goswami** and Ajay Pratap Singh, D.B.College,University of Delhi, Avinashi Kapoor, University of Delhi South Campus
Tu132	Comparison study of magnetic ordering for Fe-free and Fe-doped $LiMn_2O_4$ spinel oxide	**Yang Li**, University of Puerto Rico at Mayaguez, Boyu Ma and Ning Chen, University of Science and Technology Beijing, Jun Lu, University of Puerto Rico at Mayaguez, Aihua wang, Capital Normal University, Lihua Liu, Yang Liu, Weipeng Wang, Xiaoxiang Li, Zuxiong Xu andXingqiao Ma, University of Science and Technology Beijing, Guohui Cao, National High Magnetic Field Lab, Florida State University, Yang Li, University of Puerto Rico at Mayaguez
Tu133	Dispersion of two-spinon and collective orbital excitations in Sr_2CuO_3 investigated by resonant inelastic soft x-ray scattering	**Thorsten Schmitt**, Justine Schlappa andKejin Zhou, Paul Scherrer Institut, Villigen PSI, Switzerland, Henrik M. Ronnow, EPFL Lausanne, Vladimir N. Strocov, Paul Scherrer Institut, Villigen PSI, Switzerland, S. S. Singh, Univ. Paris Sud, France, Jean-Sebastien Caux, Univ. Amsterdam, Netherlands, Jeroen van den Brink, IFW Dresden, Germany, Joel Mesot, EPFL Lausanne, ETH Zürich, and PSI Villigen, Luc Patthey, Paul Scherrer Institut, Villigen PSI, Switzerland
Tu134	Singlet versus triplet pairing in anisotropic triangular lattices	**Sirio A. Orozco-Fuentes**, Heinrich Terborg and Luis A. Perez, Instituto de Fisica, Universidad Nacional Autonoma de Mexico

Tu135	Charge and spin pairing instabilities and inhomogeneities in nanoclusters and nanomaterials	**Armen N. Kocharian**, California State University, Los Angeles, Gayanath W. Fernando, University of Connecticut , Kalum Palandage, University of Connecticut, James W. Davenport, Brookhaven National Laboratory
Tu136	Insights into phase-slip events via dynamics of current-induced transitions from superconductive to resistive state	**Nayana Shah**, University of Cincinnati
Tu137	An orthofermion approach for thermodynamic properties of infinite U Hubbard model in one and two dimensions	**Ashok K Mishra**, Institute of Mathematical Sciences, India, Ram Kishore, Instituto Nacional de Pesquisas Espaciais, Brazil
Tu138	Quenching of ferromagnetism in beta-UB_2C and $UNiSi_2$ at high pressure	**Valdimir A. Sidorov**, Paul A. Tobash, Brian L. Scott, Tuson Park, Eric D. Bauer, LANL, Filip Ronning, and J. D. Thompson, LANL, Zachary Fisk, UC Irvine
Tu139	Pressure study on $SmNiC_2$	**B.Woo**, Sungkyunkwan University, South Korea; J.D. Thompson, F. Ronning and H. Lee, LANL,; T. Park, Y.S. Kwon, J.H. Kim, D. Jang, E. Park, S. Seo and Bonghee Woo, Sungkyunkwan University, South Korea

Thursday Poster Session 2:30 to 4:45

Poster Numb.	Title	Authors
Th001	Unconventional insulator to metal transition in chromium nitride	**P A Bhobe**, Institute for Solid State Physics, The University of Tokyo, RIKEN, A Chainani and M Taguchi, RIKEN, T Takeuchi, JASRI/SPring-8, Japan, R Eguchi and M Matsunami, The University of Tokyo, Japan. RIKEN, K Ishizaka, The University of Tokyo, Japan, Y Takata and M Oura, RIKEN, Y Senba and H Ohashi, JASRI/SPring-8, Japan, Y Nishino, M Yabashi, K Tamasaku, RIKEN and T Ishikawa, RIKEN, K Takenaka, Department of Crystalline Materials Science, Nagoya University, Japan, H Takagi, RIKEN, The Institute for Physical and Chemical Research, Japan, S Shin, Institute for Solid State Physics, The University of Tokyo, RIKEN
Th002	Spectral properties of one dimensional ionic Hubbard model	**Gun Sang Jeon** and Ara Go, Seoul National University
Th003	Dielectric breakdown in the 1D Hubbard model	**Shunsuke Kirino** and Kazuo Ueda, Institute for Solid State Physics, University of Tokyo
Th004	Role of local moments near a Mott transition	**Serge Florens**, Institut Neel and UJF, CNRS, Grenoble, Priyanka Mohan and Rajesh Narayanan, Department of Physics, Indian Institute of Technology, Madras, Chennai 600036, India
Th005	Orbital-selective Mott transition in 1D two-orbital Hubbard model	**Evgeny Plekhanov**, Adolfo Avella and Ferdinando Mancini, Dipartimento di Fisica E.R. Caianiello - Unità CNISM di Salerno Università degli Studi di Salerno, Italy
Th006	Variational cluster approximation study of Mott transition with strong spin-orbit coupling	**Tomonori Shirakawa**, Hiroshi Watanabe and Seiji Yunoki, Computational Condensed Matter Physics Laboratory, RIKEN ASI, Japan, and CREST, Japan Science and Technology Agency (JST), Japan
Th007	Origin of the zero bias anomaly in the Anderson-Hubbard model	**Rachel Wortis**, W.A. Atkinson and Hongyi Chen, Trent University
Th008	Mott transition in multi-orbital Hubbard models for iron pnictides	**Rong Yu** and Qimiao Si, Rice University
Th010	Pump-probe reflectivity study of ultrafast dynamics of strongly correlated 5f electrons in UO_2	**Antoinette J Taylor**, Tomasz Durakiewicz, George Rodriguez and Yong Q An, LANL
Th011	Effect of elemental substitutions on ruthenates with pyrochlore-type structure	**Masaki Kato**, Miho Fukatsu, Syuji Harada and Ken Hirota, Doshisha University
Th012	Non Fermi liquid behavior in the $Pr_{1-x}Nd_xOs_4Sb_{12}$ system	**P.C. Ho**, Physics, Califor. State U., Fresno, M. B. Maple, R. E. Baumbach, Physics & IPAPS/ UC San Diego, T. Yanagisawa, Hokkaido U. Japan
Th013	Rattling and quadrupole ordering in clathrate compound $Pr_3Pd_{20}Ge_6$	**Genki Ano**, Kazuo Matsuo, Koji Araki, Yoshiaki Tachikawa, Keisuke Mitsumoto, Mitsuhiro Akatsu, Yuichi Nemoto and Terutaka Goto, Graduate School of Science and Technology, Niigata University, Niigata, Japan, Naoya Takeda, Faculty of Engineering, Niigata University, Niigata, Japan, Akiko Kikkawa, Tsukuba, Japan, Andreas Doenni and Hideaki Kitazawa, National Institute for Materials Science, Tsukuba, Japan

Th014	The ground state of $Ce_3Pd_{20}Si_6$	**P. P. Deen**, Institut Laue-Langevin, France, A. M. Strydom, Physics Department APK, University of Johannesburg, S. Paschen, Institut fur Festkorperphysik, Austria., D. T. Adroja and W. Kockelmann, ISIS Facility, Rutherford Appleton Laboratory, UK, S. Rols, Institut Laue-Langevin, Grenoble, France
Th016	NMR study on heavy fermion compound $CePtSi_2$ at ambient pressure	**Mitsuharu Yashima**, Tatsuya Unemori, Hidekazu Mukuda, Yoshio Kitaoka, Naoto Nishimura, Fuminori Honda, Tetsuya Takeuchi, Kiyohiro Sugiyama and Rikio Settai, Yoshichika Onuki, Graduate School of Science, Osaka University
Th017	Non-Fermi-liquid normal-state behavior in the heavy-fermion superconductor Ce_2PdIn_8	**Dariusz Kaczorowski**, Daniel Gnida, Adam P. Pikul and Vinh Hung Tran, Institute of Low Temperature and Structure Research, Polish Academy of Sciences
Th018	Quantum critical fluctuations in the heavy fermion compound $Ce(Ni_{0.935}Pd_{0.065})_2Ge_2$	**CuiHuan Wang** and Jon M. Lawrence, University of California, Irvine, Sung Chang, Jose A. Rodriguez, and Jeff W. Lynn, NIST, Andrew D. Christianson, ORNL, Eric D. Bauer, Filip Ronning, Joe D. Thompson, Krzysztof Gofryk and Hen J. McClellan, LANL
Th019	Universal signatures of metamagnetic quantum criticality in $CeRu_2Si_2$	**Franziska Weickert**, MPI for Chemical Physics of Solids, Germany, Markus Garst, Cologne University, Germany, Philipp Gegenwart, University Göttingen, Germany, Manuel Brando and Frank Steglich, MPI for Chemical Physics of Solids Germany
Th020	Comparison of the Shastry-Sutherland lattice stability in Ce_2Pd_2Sn as a function of field, Ni by Pd or In by Sn substitution	Julian G. Sereni, Centro Atomico Bariloche
Th021	Transport and magnetic behavior under pressure and high-resolution photoemission studies of $Ce_2Rh_{0.7}Co_{0.3}Si_3$	**K. Mukherjee**, Katik K Iyer, Swapnil Patil, K. Maiti and E.V. Sampathkumaran, Tata Institute of Fundamental Research, India
Th022	An Al-NQR/NMR study of $CeOs_2Al_{10}$	**Harukazu Kato**, Tomoaki Takesaka, Takashi Nishioka and Masahiro Matsumura, Kochi Univ., Yo Tokunaga and Shinsaku Kambe, Japan Atomic Energy Agency
Th023	The Hall effect in quantum critical $CeAuSb_2$	**Andre M. Strydom**, Physics Department, University of Johannesburg, and Arumugam Thamizhavel TATA Institute of Fundamental Research
Th024	Sharp valence change as origin of drastic change of Fermi surface and transport anomalies in $CeRhIn_5$ under pressure	**Shinji Watanabe** and Kazumasa Miyake, Osaka University
Th025	Study on anisotropic scattering near quantum fluctuations in $CeCoIn_5$ under pressure	**Hanoh Lee**, LANL, Eunsung Park, Soonbeom Seo, Sungkyunkwan University, Tuson Park, LANL, Sungkyunkwan University, E.D. Bauer, J.D. Thompson, LANL, Eunsung Park, Sungkyunkwan University, Korea
Th026	Field and concentration dependent scaling behavior of the thermal expansion near the quantum critical point of $CeCu_{6-x}Au_x$	**Kai Grube**, Stefanie Drobnik, Sebastian Zaum, Veronika Fritsch, Thomas Wolf, Peter Adelmann, Peter Schweiss and Hilbert v. Löhneysen, Karlsruher Institut für Technologie, Germany
Th027	Competition between ferromagnetism, antiferromagnetism and superconductivity at the (quantum) critical points in $CeFeAs_{1-x}P_xO$	**Anton Jesche**, Max Planck Institute for Chemical Physics of Solids, Cornelius Krellner,Max Planck Institute for Chemical Physics of Solids, Christoph Geibel, Max Planck Institute for Chemical Physics of Solids

Th028	Zero-field quantum criticality in the valence fluctuating heavy fermion superconductor β-$YbAlB_4$	**Yosuke Matsumoto**, Satoru Nakatsuji, Kentaro Kuga, Yoshitomo Karaki, Naoki Horie, Yasuyuki Shimura and Toshiro Sakakibara, Institute for Solid State Physics, University of Tokyo, Andriy H. Nevidomskyy and Piers Coleman, Rutgers University
Th029	Quantum phase transitions induced by chemical substitution in the heavy fermion systems $YbAlB_4$	**Kentaro Kuga**, Yoshitomo Karaki, Yosuke Matsumoto, Takahiro Tomita, Naoki Horie, Junichi Yamaura, IYoko Kiuchi, and Satoru Nakatsuji, Institute for Solid state Physics, University of Tokyo
Th030	Low-temperature thermal transport coefficients of heavy fermion β-$YbAlB_4$	**Yo Machida**, Chikako Ogura and Koichi Izawa, Tokyo Institute of Technology, Kentaro Kuga and Satoru Nakatsuji, University of Tokyo
Th031		**{Withdrawn}**
Th032		**{Withdrawn}**
Th033	Ultrasonic investigation of a heavy fermion compound YbAgGe	**Yoshiki Nakanishi**, Reiko Kashiwazaki, Kazuhisa Deto, Fumitaka Shichinomiya, Mitsuteru Nakamura, and Masahito Yoshizawa, Iwate University, Hirokazu Kubo, Kazunori Umeo, Takahiro Onimaru and Toshiro Takabatake, Hiroshima University
Th034	Relation between metamagnetic transition and quantum critical point in heavy fermion compound $YbIr_2Zn_{20}$	**Shinichi Yasui**, Fuminori Honda, Shingo Yoshiuchi, Masaki Matsushita, Masahiro Ohya and Keisuke Katayama, Graduate School of Science, Osaka University, Etsuji Yamamoto and Yoshinori Haga, Advanced Science Research Center, Japan Atomic Energy Agency, Tetsuya Takeuchi, Low Temperature Center , Osaka University, Kiyohiro Sugiyama, Rikio Settai and Yoshichika Onuki, Graduate School of Science, Osaka University
Th035	Metamagnetic behavior in heavy fermion compound $YbIr_2Zn_{20}$	**Tetsuya Takeuchi**, Low Temperature Center, Osaka University, Japan, Shinichi Yasui, Masatoshi Toda, Masaki Matsushita, Shingo Yoshiuchi, Masahiro Ohya, Keisuke Katayama, Yusuke Hirose, Naohisa Yoshitani, Fuminori Honda and Kiyohiro Sugiyama, Graduate School of Science, Osaka University, Toyonaka, Osaka 560-0043, Japan, Masayuki Hagiwara, KYOKUGEN, Osaka University, Japan, Koichi Kindo, ISSP, University of Tokyo, Japan, Etsuji Yamamoto and Yoshinori Haga, Advanced Science Research Center, Japan Atomic Energy Agency, Japan, Toshiki Tanaka and Yasunori Kubo, Department of Physics, College of Humanities and Sciences, Nihon University, Tokyo, Japan, Rikio Settai and Yoshichika Onuki, Graduate School of Science, Osaka University, Japan
Th036	Metamagnetic transition in heavy fermion compounds YbT_2Zn_{20} (T : Co, Rh, Ir)	**Y Hirose**, M Toda, S Yoshiuchi, S Yasui, K Sugiyama and F Honda, Graduate School of Science, Osaka University, M Hagiwara, KYOKUGEN, Osaka University, K Kindo, ISSP, University of Tokyo, R Settai and Y Onuki, Graduate School of Science, Osaka University
Th037	Unconventional magnetic field tuned quantum ground states in the noncentrosymmetric compound $Yb_2Fe_{12}P_7$	**Ryan E. Baumbach**, James J. Hamlin, Lei Shu, Diego A. Zocco and M. Brian Maple, University of California, San Diego, Jim R. O'Brien, Quantum Design, Pei-Chun Ho, California State University, Fresno
Th038	Quantum criticality of $YbRh_2Si_2$ and related compounds studied by thermal conductivity and thermoelectric coefficients	**Koichi Izawa**, Kosuke Tomokuni and Yo Machida, Tokyo Institute of Technology, Gerard Lapertot, Georg Knebel, Jean-Pascal Brison and Jacques Flouquet, CEA-Grenoble
Th040	Dynamical instability in multi-band superconductors	**Aline Ramires Neves de Oliveira**, and Mucio A. Continentino, CBPF - Centro Brasileiro de Pesquisas Físicas
Th041	Scaling behavior of heavy fermion metals	**Vasily R. Shaginyan**, Petersburg Nuclear Physics Institute, RAS, Gatchina, Russia, Konstantin G. Popov, Komi Science Center, Syktyvkar, Russia

Th043	Theory of unconventional (nematic) metamagnetic electron states in the t_{2g}-orbital band system of $Sr_3Ru_2O_7$	**Congjun Wu**, Wei-Cheng Lee and Daniel P. Arovas, Department of Physics, UCSD
Th044	Entropy accumulation, divergent Gruneisen ratio, and crossover energy scales near quantum critical points	**Jianda Wu**, Rice University, Lijun Zhu, LANL, Qimiao Si, Rice University
Th045	Quantum criticality in multiferroics under high magnetic field	**Jae Wook Kim**, S. H. Khim, S. H. Chun, S. Y. Haam and Y. S. Oh, Seoul National Univeristy, S. Park, H. Yi and S.-W. Cheong, Rutgers University, P. A. Sharma, NHMFL/LANL, Y. Jo and L. Balicas, NHMFL, M. Jaime and N. Harrison, NHMFL/LANL, J. H. Han, Sungkyunkwan University, G. S. Jeon, Seoul National Univeristy, C. Batista, LANL, P. Coleman, Rutgers University
Th046	Manifestations of quantum critical fluctuations in ferroelectrics	**Peter S Riseborough**, Temple University, Jason C Lashley, LANL
Th048	Infinite randomness and quantum Griffiths effects in a classical system: the randomly layered Heisenberg magnet	**Priyanka Mohan** and Rajesh Narayanan, IIT Madras, Fawaz Hrahshe and Thomas Vojta, Missouri University of Science and Technology
Th050	Entanglement and quantum phase transition in the anisotropic Kondo necklace model	**Jereson Silva-Valencia**, Juan J. Mendoza-Arenas and Roberto Franco, Universidad Nacional de Colombia
Th051	DMRG calculation of the phase diagram of the anisotropic Kondo necklace model	**Juan J Mendoza Arenas**, Roberto Franco and Jereson Silva Valencia, Universidad Nacional de Colombia
Th052	Magnetically robust non-Fermi liquid behavior due to the competition between crystalline-electric-field singlet and Kondo-Yosida singlet in f^2-based heavy fermion systems	**Shinya Nishiyama**, Hiroyasu Matsuura, and Kazumasa Miyake, Graduate School of Engineering Science, Osaka University
Th053	Superconducting quantum critical point in multi-band systems:effect of fluctuations	**Mucio A. Continentino**, Aline Ramires, Centro Brasileiro de Pesquisas Fisicas
Th054	Scaling and relaxational dynamics near Kondo-destroying quantum critical points	**Jedediah H. Pixley**, Rice University, Stefan Kirchner, Max Planck Institute for the Physics of Complex Systems, Matthew T. Glossop and Qimiao Si, Rice University
Th055	Spontaneous breaking of four-fold rotational symmetry in two-dimensional electron systems and rearrangement of single-particle degrees of freedom	**Mikhail Zverev**, Kurchatov Institute, John W. Clark and Zohar Nussinov, Washington University, Victor Khodel, Kurchatov Institute & Washington University
Th056	Ultrasonic studies of MnSi and FeSi	**Alla E. Petrova**, Institute for High Pressure Physics, Troitsk 142190 Moscow Region, Russia , Vladimir N. Krasnorussky and, Sergei M. Stishov, Institute for High Pressure Physics, Moscow Region, Russia

Th057	Lattice dynamics in the itinerant helical magnet MnSi	**P.A. Alekseev**, ISSSPh, Russian Research Centre Kurchatov Institute, Moscow, Russia, E.S. Clementyev, Russian Research Centre Kurchatov Institute, Moscow, Russia and LNS, Institute for Nuclear Research of Russian Academy of Sciences, Moscow, Russia, A.S. Ivanov, Institut Laue Langevin, France, D. Lamago, Forschungszentrum Karlsruhe, Institut für Festkörperphysik, Karlsruhe, Germany and Laboratoire Léon Brillouin, France, J-M. Mignot, Laboratoire Léon Brillouin, France, A.E. Petrova and S.M. Stishov, Institute for High Pressure Physics of Russian Academy of Sciences, Moscow Region, Russia
Th059	Effect of phase fluctuations on the superconducting properties of strongly disordered 3D NbN thin films	**Madhavi Chand** and Mintu Mondal, Tata Institute of Fundamental Research, Mumbai, India, Archana Mishra, Indian Institute of Technology, Roorkee, Anand S. Kamlapure, John Jesudasan and Vivas C. Bagwe, Tata Institute of Fundamental Research, Mumbai, India, Sudhansu S. Mandal, Indian Association for the Cultivation of Science, Kolkata, India, Vikram Tripathi and Pratap Raychaudhuri, Tata Institute of Fundamental Research, Mumbai, India,
Th060	Quantum dynamical phase transition in the soliton nucleation model of density wave transport	**John H. Miller**, Jr., University of Houston
Th061	Quantum criticality of quantum Hall plateau to plateau transitions in alloy disordered two-dimensional electron systems	**Wanli Li**, Princeton University, J.S. Xia and C.L. Vicente, University of Florida and NHMFL, W. Pan, Sandia National Labs, D.C. Tsui, L.N. Pfeiffer and K.W. West, Princeton University
Th062	Detailed investigation of the c/a dependence of the superconductivity in $CeCoIn_5$	**Sebastian Zaum**, Kai Grube and Frédéric Hardy, Karlsruher Institut für Technologie, , Germany, Eric D. Bauer, Joe D. Thompson, LANL, Hilbet v. Löhneysen, Karlsruher Institut für Technologie, Karlsruhe, Germany
Th063	Flux distribution in vortex lattice states in d-wave and paramagnetic superconductors	**Kazushi Aoyama**, Ryusuke Ikeda, Yuhki Hatakeyama, Kyoto University
Th064	Why is $PuCoGa_5$ superconducting at ten times the transition temperature of $CeCoIn_5$?	**F. Ronning**, E.D. Bauer, J.N. Mitchell and J.A. Kennison, LANL, H. Sakai, JAEA, S.-H. Baek, IFW, Dresden, C.H. Mielke, M.M. Altarawneh, J.J. Joyce, J.-X. Zhu and M. Graf, LANL
Th065	Study of the spin resonance in $CeCoIn_5$ as a function of magnetic field and La-doping	**Justin Panarin**, Stéphane Raymond and Gérard Lapertot, CEA-Grenoble, INAC/SPSMS, Jean-Michel Mignot, CEA-Saclay, CNRS, Lab Leon Brillouin, Jacques Flouquet, CEA-Grenoble, INAC/SPSMS
Th066	NMR study of magnetic order and FFLO state in $CeCoIn_5$	**Ken-ichi Kumagai**, Hokkaido University, Hiroaki Shishido and Yuji Matsuda, Kyoto University
Th067	Superconducting condensation energy in a diluted Kondo lattice: the case of $Ce_{1-x}R_xCoIn_5$ (R=La, Yb, Y, Ca, Th, Gd, Er, Eu, Lu)	**Cigdem Capan** and Zachary Fisk, University of California Irvine, Eric D. Bauer, Yifeng Yang, Joe D. Thompson, LANL
Th068	Coexistence of d-wave superconductivity and antiferromagnetism induced by paramagnetic depairing	**Ryusuke Ikeda** and Yuhki Hatakeyama, Kyoto University

Th069	Point-contact spectroscopy in heavy-fermion superconductors	**Mikael Fogelstrom**, Chalmers University of Technology, W. K. Park and L. H. Greene, University of Illinois at Urbana-Champaign, Gernot Goll, University of Karlsruhe, Matthias J. Graf, LANL, Wan-Kyu Park, University of Illinois at Urbana-Champaign
Th070	Magnetization in the superconducting mixed state of the heavy-fermion compound UBe_{13}	**Yusei Shimizu**, Yoichi Ikeda and Takumi Wakabayashi, Graduate School of Science, Hokkaido University, Kenichi Tenya, Faculty of Education, Shinshu University, Yoshinori Haga, Advanced Science Research Center, Japan Atomic Energy Agency, Hiroyuki Hidaka, Graduate School of Science, Hokkaido University, Tatsuya Yanagisawa, Creative Research Initiative 'Sousei', Hokkaido University, Hiroshi Amitsuka, Graduate School of Science, Hokkaido University
Th071	The microscopic magnetisation dynamics in the normal and the superconducting state of UBe_{13} investigated by inelastic neutron scattering	**Arno Hiess**, Institut Laue - Langevin, Grenoble, France, Oliver Stockert, MPI-CPfS, Dresden, Germany, Astrid Schneidewind, Helmholtz - Zentrum Berlin, Germany, Zachary Fisk, University of California, Irvine, USA
Th073	Small-angle neutron scattering study of the vortex lattice in $PrOs_4Sb_{12}$	**Simon Gerber**, Nikola Egetenmeyer and Jorge L. Gavilano, ETH Zurich & Paul Scherrer Institute, Switzerland, Michel Kenzelmann, Paul Scherrer Institute, Switzerland, Andea D. Bianchi and Alexandre Desilets-Benoit, Universite de Montreal, Canada, Christian Pfleiderer, Technische Universitaet Muenchen, Germany, Sebastian Muehlbauer, ETH Zurich, Switzerland, Ryan Baumbach and Brian Maple, University of California at San Diego
Th074	Multiple transitions including higher order transitions	**Bohdan Andraka**, University of Florida, Avadh Saxena, LANL
Th075	Soft x-ray and laser photoemission studies of superconducting filled skutterudite $PrPt_4Ge_{12}$	**Yoshiaki Nakamura**, Okayama University, Hiroyuki Okazaki, Okayama University and JST-CREST, Rikiya Yoshida, Takanori Wakita, Masaaki Hirai and Yuji Muraoka, Okayama University, Hiroyuki Takeya and Kazuto Hirata, National Institute for Materials Science, Mario Okawa, Shik Shin and Syuntaro Watanabe, ISSP, University of Tokyo, C.-H. Chen, Chinese Academy of Science, Hiroshi Kumigashira and Masaharu Oshima, University of Tokyo, Takayoshi Yokoya, Okayama University
Th076	Electronic band structure of superconducting $PrPt_4Ge_{12}$	**J. Wosnitza**, B. Bergk, O. Ignatchik and A. Polyakov, Forschungszentrum Dresden-Rossendorf, Hochfeldmagnetlabor Dresden, R. Gumeniuk, A. Leithe-Jasper, W. Schnelle, M. Nicklas, H. Rosner, and Yu. Grin, Max-Planck-Institut für Chemische Physik fester Stoffe
Th077	Spin distribution in the superconducting ferromagnet UCoGe determined by polarized neutron diffraction	**K. Prokes**, Helmholtz-Zentrum Berlin fuer Materialien und Energy, Germany, A. de Visser, Y.K. Huang, Van der Waals-Zeeman Institute, The Netherlands, B. Fak, E. Ressouche, Commissariat a l'Energie Atomique, Grenoble, France
Th078	UCoGe: response to high pressure and hydrogen doping	**Ladislav Havela**, Charles University Prague, Anna Adamska, Pedagogical University Cracow, Suzy Surble and Steve Heathman, EC, JRC, ITU Karlsruhe, Jiri Pospisil and Stanislav Danis, Charles University Prague
Th079	Magnetic and superconducting properties of UCoGe refined by SSE	**Jiri Pospisil**, Jan Prokleska, Vladimir Sechovsky, Charles University, Faculty of Mathematics and Physics, The Department of Condensed Matter Physics

Th080	Evolution of magnetic ground state of UCoGe doped by Ru	**Vladimir Sechovsky**, Charles University, Samanta Tapas, Saha Institute of Nuclear Physics, Jiri Pospisil, Martin Divis, Jiri Prchal, Jan Prokleska, Charles University, Faculty of Mathematics and Physics, Department of Condensed Matter Physics, Prague, Czech Republic
Th081	Thermal conductivity measurements of the ferromagnetic superconductors URhGe and UCoGe	**Ludovic Howald**, Valentin Taufour, Dai Aoki, Jacques Flouquet, and Jean-Pascal Brison, CEA-INAC-SPSMS Grenoble
Th082	Upper critical field near ferromagnetic quantum criticality	**Yasuhiro Tada**, Norio Kawakami, Satoshi Fujimoto, Kyoto University
Th084	Ferromagnetic uranium superconductors: case of UGe_2	**Valentin Taufour**, Dai Aoki and Jacques Flouquet, CEA Grenoble
Th085	Neutron scattering studies of ferromagnetic superconductor UGe_2 under pressure	**D. A. Sokolov** and A. D. Huxley, The University of Edinburgh, UK, R. Ritz, Technische Universitat Munchen, Germany, T. Keller, MPI, Stuttgart, Germany, C. Pfleiderer, Technische Universitat Munchen, Germany
Th086	Electronic structure of URu_2Si_2 from ARPES	**Yinwan Li**, Tomasz Durakiewicz, John J. Joyce, Paul Tobash, Eric D. Bauer, and Kevin S. Graham, LANL
Th087	Soft x-ray angle-resolved photoemission study of URu_2Si_2	**Ikuto Kawasaki**, Shin-ichi Fujimori, Yukiharu Takeda, Tetsuo Okane, Akira Yasui and Yuji Saitoh, Synchrotron Radiation Research Unit, Japan Atomic Energy Agency, Japan, Hiroshi Yamagami, Department of Physics, Faculty of Science, Kyoto Sangyo University, Japan, Yoshinori Haga, Etsuji Yamamoto, Advanced Science Research Center, Japan Atomic Energy Agency, Japan, Yoshichika Onuki, Graduate School of Science, Osaka University, Japan
Th088	Electronic structure and surface state modification of URu_2Si_2	**J. D. Denlinger** and O. Krupin, Lawrence Berkeley National Lab, B. J. Kim and J. W. Allen, University of Michigan, K. Haule, Kyoo Kim and G. Kotliar, Rutgers University, J. L. Sarrao, LANL, N. P. Butch and M. B. Maple, UC San Diego
Th089	Neutron and x-ray diffraction studies of URu_2Si_2 under pressure	**Nicholas P. Butch**, Center for Nanophysics and Advanced Materials, Dept. of Physics, University of Maryland, Jason R. Jeffries, Lawrence Livermore National Laboratory, Livermore, CA, Songxue Chi, Juscelino Leao and Jeffrey W. Lynn, NIST Center for Neutron Research, Gaithersburg, MD, James J. Hamlin, M. Brian Maple, University of California, San Diego
Th090	Anisotropy of magnetic susceptibility of URu_2Si_2 under pressure	**Gaku Motoyama**, Hideki Sakai, Akira Yamaguchi, Akihiko Sumiyama and Yasukage Oda, University of Hyogo
Th091	High-pressure electrical resistivity measurement on heavy fermion superconductor URu_2Si_2 using super clean crystal	**Naoyuki Tateiwa**, Yoshinori Haga, Tatsuma D. Matsuda, Takashi Sugai and Etsuji Yamamoto, Advanced Science Research Center, Japan Atomic Energy Agency
Th092	Anomalous low-field diamagnetic response in ultraclean URu_2Si_2 superconductor	**Masaaki Shimozawa** and Hiroaki Shishido, Kyoto University, Marcin Konczykowski, Ecole Polytechnique, Yoshinori Haga, Tatsuma D. Matsuda and Etsuji Yamamoto, Japan Atomic Energy Agency, Yoshichika Onuki, Japan Atomic Energy Agency, Osaka University, Yoichi Yanase, Niigata University, Takasada Shibauchi, Yuji Matsuda and Ryuji Okazaki, Kyoto University
Th093	Precise study of the excitations in URu_2Si_2	**Elena Hassinger**, Stephane Raymond, Dai Aoki, Valentin Taufour, Louis-Pierre Regnault, Jacques Flouquet and Frederic Bourdarot, CEA-Grenoble INAC-SPSMS

Th094	Spin resonance and dual nature of hidden order in URu_2Si_2	**Alexander Balatsky**, LANL
Th095	Fermi surface study of URu_2Si_2 in hidden order and antiferromagnetic state	**Elena Hassinger**, Georg Knebel, Dai Aoki, Tatsuma Matsuda, Valentin Taufour and Jacques Flouquet, CEA Grenoble, INAC
Th096	Theoretical reconsideration of paramagnetic and antiferromagnetic Fermi surfaces in URu_2Si_2	**Hiroshi Yamagami**, Kyoto Sangyo University
Th097	Laser angle-resolved photoemission on URu_2Si_2	**Rikiya Yoshida**, Yoshiaki Nakamura and Masaki Fukui, Okayama University, Etsuji Yamamoto and, Yoshinori Haga, JAEA, Yoshichika Onuki, Osaka University/JAEA, Mario Okawa, Shik Shin and Shuntaro Watanabe, ISSP, University of Tokyo, C.-T. Chen, CAS, Masaaki Hirai, Yuji Muraoka and Takayoshi Yokoya, Okayama University
Th098	Pressure-induced change of the superconducting properties of $CeCu_2Si_2$	**E. Lengyel**, M. Nicklas, H. S. Jeevan, C. Geibel and F. Steglich, Max Planck Institute for Chemical Physics of Solids, Germany
Th099	Evidence for unconventional d-wave superconducting state in $CeCu_2Si_2$	**Hugo A. Vieyra** and Niels Oeschler, Max Planck Institute for Chemical Physics of Solids, David Parker, US Naval Research Laboratory, Hirale S. Jeevan, I. Physikalisches Institut, George-August-Universitaet, Christoph Geibel and Frank Steglich, Max Planck Institute for Chemical Physics of Solids
Th100	Magnetic-field modulation of the Josephson effect between polycrystalline $CeCu_2Si_2$ and Al	**Akihiko Sumiyama**, Naoya Miyakawa, Yusuke Ushida, Gaku Motoyama, Akira Yamaguchi and Yasukage Oda, Graduate School of Material Science, University of Hyogo
Th101	Superconductivity in $SrPd_2Ge_2$ single crystals	**Nak-Heon Sung,** Gwangju Institute of Science and Technology (GIST)**,** Jong-Soo Rhyee, Samsung Advanced Institute of Technology (SAIT), B.Y. Kang, B.K. Cho, Gwangju Institute of Science and Technology (GIST)
Th102	Magnetism in the $CeIr(Si_xGe_{1-x})_3$ compounds	**Jan Prokleska**, Jiri Pospisil and Vladimir Sechovsky, Charles University
Th103	Field dependence of thermal conductivity in the noncentrosymmetric superconductor $LaRhSi_3$	**C. F. Miclea** and N. Kurita, LANL, C. Putzke, Department de Physique, Universite de Montreal, Canada, G. Seyfarth, Department de Physique, Universite de Montreal, Montreal, Canada; Department of Physics and Astronomy, University of California, Irvine, C. Capan, Department of Physics and Astronomy, University of California, Irvine, A. Bianchi, Department de Physique, Universite de Montreal, Z. Fisk, Department of Physics and Astronomy, University of California, Irvine, R. Movshovich, LANL
Th104	Platinum metal silicides and germanides: superconductivity in non-centrosymmetric intermetallics	**K. Miliyanchuck**, University of Vienna, F. Kneidinger, R.T. Khan, E. Royanian, L. Salamakha, G. Hilscher, H. Michor and E. Bauer, Vienna University of Technology, R. Podloucky and P. Rogl, University of Vienna

Th105	Mo_3Al_2C revisited, a superconductor at 9 K without inversion symmetry	**Gerda Rogl**, Institute of Solid State Physics, Vienna University of Technology, Vienna, Austria, Tahir Khan, Institute of Solid State Physics, Vienna University of Technology, Vienna, Austria, Esmaeil Royanian, Institute of Solid State Physics, Vienna University of Technology, Vienna, Austria, Hilscher Gerfried, Institute of Solid State Physics, Vienna University of Technology, Vienna, Austria, Herwig Michor, Institute of Solid State Physics, Vienna University of Technology, Vienna, Austria, Ernst Bauer, Institute of Solid State Physics, Vienna University of Technology, Vienna, Austria, Xinqiu Chen, Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China, Peter F. Rogl, Institute of Physical Chemistry, University of Vienna, Austria, Raimund Podloucky, Institute of Physical Chemistry, University of Vienna, Austria
Th106	Superconducting order parameters in nonmagnetic borocarbides RNi_2B_2C (R=Y, Lu) probed by point-contact Andreev reflection spectroscopy	**Xin Lu** and W. K. Park, Department of Physics and Frederick Seitz Material Research Laboratory, University of Illinois at Urbana-Champaign. Choi and S.-I. Lee, Department of Physics, Sogang University, Republic of Korea, S. Yeo, Atomic Energy Research Institute, Republic of Korea, S. L. Bud'ko and P. C. Canfield, Ames Laboratory and Iowa State University, L. H. Greene, Department of Physics and Frederick Seitz Material Research Laboratory, University of Illinois at Urbana-Champaign
Th107	Anomalous pressure effect on the superconducting transition temperatures and critical fields of $Y_{1-x}Ho_x\ Ni_2B_2C$	**Gendo Oomi**, Kyushu Univ.
Th108	Field-direction dependence of novel high-field phase in Sr_2RuO_4	**Kenichi Tenya**, Shinshu University, Makoto Yokoyama, Ibaraki University, Hiroshi Amitsuka, Hokkaido University, Kazuhiko Deguchi, Nagoya University, Yoshiteru Maeno, Kyoto University
Th109	Anomalous optical properties in half-filled layered organic conductors	**Ikuzo Kanazawa**, Tokyo Gakugei University
Th110	From charge- and spin-ordering to superconductivity in the organic charge-transfer solids	**Sumit Mazumdar**, University of Arizona, Hongtao Li , University of Arizona, R. Torsten Clay, Mississippi State University
Th111	NMR studies of superconductivity in κ-(BEDT-TTF)$_2$Cu(NCS)$_2$ beyond the Pauli limiting field	**S. E. Brown** and J. Wright, UCLA, E. Prettner, J. S. Brooks, A. Reyes and P. Kuhns, FSU/NHMFL, W. G. Clark, UCLA, J. Schlueter, Argonne National Laboratory, R. Kato, RIKEN
Th112	Current and spin correlations in the Fulde-Ferrell-Larkin-Ovchinnikov state of a s-wave superconductor	**Poulumi Dey**, Saurabh Basu, Department of Physics, IIT Guwahati, Guwahati, Ram Kishore, Instituto Nacional de Pesquisas Espaciais, Brazil
Th113	Larkin-Ovchinnikov-Fulde-Ferrell (LOFF) phase in $(TMTSF)_2X$ conductors: theory versus experiment	**Si Wu** and Andrei Lebed, Dept. of Physics, Univ. of Arizona
Th114	Topological Hall effect in inhomogeneous superconducting states	**Satoshi Fujimoto**, Department of Physics, Kyoto University
Th115	Pressure effect on the superconductivity of β-pyrochlore oxides	**Takayuki Isono**, Daisuke Iguchi, Yo Machida and Koichi Izawa, Department of Physics, Tokyo Institute of Technology, Bernard Salce and Jacques Flouquet, SPSMS, CEA-Grenoble, Hiroki Ogusu, Jun-ichi Yamaura, and Zenji Hiroi, Institute for Solid State Physics, University of Tokyo

Th116	Superconductivity in $Pd_{17}Se_{15}$ as contrasted with $Rh_{17}S_{15}$	**H. R.Naren**, A. Thamizhavel and S. Ramakrishnan, Tata Institute of Fundamental Research, Mumbai, India
Th117	(P-T) phase diagram of clathrate superconductor $Ba_{24}Ge_{100}$	**Tomoko Kagayama** and Katsuya Shimizu, Kyokugen, Osaka Univ., Katsumi Tanigaki, Department of Physics, Tohoku Unv., Atsushi Miyake, Kyokugen, Osaka Univ.
Th118	Possible indicators for low dimensional superconductivity in the quasi 1D carbide Sc_3CoC_4	**Ernst-Wilhelm Scheidt**, Christoph Hauf, Florian Reiner, Georg Eickerling and Wolfgang Scherer, CPM, Institut für Physik, Universität Augsburg
Th119	Spin-density-wave transition in superconducting Mo_3Sb_7	**R. T. Khan**, Institute of Solid State Physics, Vienna University of Technology, Austria, P. Wiśniewski, Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Poland, E. Bauer, Institute of Solid State Physics, Vienna University of Technology, Austria, Vinh Hung Tran, Institute of Low Temperature and Structure Research, Polish Academy of Sciences
Th120	Effects of weak-disorder on the critical behavior of a p-wave superconductor	**Priyanka Mohan** and Rajesh Narayanan, Department of Physics, Indian Institute of Technology, Madras
Th121	Meissner effect of the odd-frequency superconductivity	**Yuki Fuseya** and Kazumasa Miyake, Department of Materials Engineering Science, Osaka University
Th122	Pair density wave instability and Cooper pair insulators in gapped fermion systems	**Predrag Nikolic**, George Mason University, Anton. A. Burkov, University of Waterloo, Arun Paramekanti, University of Toronto
Th123	A statistically consistent renormalized mean-field approach to the t-J model and Kondo pairing	**Jozef Spalek**, Jakub Jedrak and Jan Kaczmarczyk, Institute of Physics, Jagiellonian University, Poland
Th124	Sample dependence of superconductivity for V_3Si under high pressure	**Shigeki Tanaka**, Atsushi Miyake, Tomoko Kagayama and Katsuya Shimizu, Kyokugen, Osaka Univ.
Th125	Evidence for magnetically driven superconducting Q phase of $CeCoIn_5$ for H || [1 0 0]	**Simon Gerber**, Nikola Egetenmeyer and Jorge L. Gavilano, ETH Zurich & Paul Scherrer Institute, Switzerland, Thierry Straessle, Paul Scherrer Institute, Switzerland, Andrea D. Bianchi, Universite de Montreal, Canada, Eric Ressouche, CEA/Grenoble, France, Roman Movshovich, Eric D. Bauer, John L. Sarrao and Joe D. Thompson, LANL, Michel Kenzelmann, Paul Scherrer Institute, Switzerland
Th126	Superconducting properties of $PuCoGa_5$	**Moaz M. Altarawneh**, Charles H. Mielke Ross D. McDonald, Jeremy N. Mitchell, Filip Ronning, John A. Kennison and Eric D. Bauer, LANL
Th127	Electronic structure of the heavy-fermion superconductor $PuCoGa_5$ probed via the dynamics of photoinduced quasiparticles	**Diyar Talbayev**, Yale University, Kenneth S. Burch, University of Toronto, Elbert E.M. Chia, Nanyang Technological University, Stuart A. Trugman, Jian-Xin Zhu, Eric D. Bauer, John A. Kennison, Jeremy N. Mitchell, Joe D. Thomspon, John L. Sarrao and Antoinette J. Taylor, LANL
Th128	Electronic structure of Pu materials: Mott insulators to metals	**J.J. Joyce**, T. Durakiewicz, K.S. Graham, E.D. Bauer, D.P. Moore, J.N. Mitchell, J.A. Kennison, J.L. Sarrao, T.M. McCleskey, E. Bauer, A.K. Burrell, R.L. Martin, J.M. Wills, J.-X. Zhu, LANL, L.E. Roy, Savannah River Site, G.E. Scuseria, Rice University
Th129	Elastic moduli of α, β, and γ plutonium, three different metals	**Yoko Suzuki**, Victor R. Fanelli, Albert Migliori, Jonathan B. Betts, J. N. Mitchell, M. Ramos, F. J. Freibert, and C. H. Mielke, LANL
Th130	Complex magnetic order in $Pu_2M_3Si_5$ (M=Co, Ni)	**E. D. Bauer**, P. H. Tobash, J. N. Mitchell, J. A. Kennison, B. L. Scott and J. D. Thompson, LANL

Th131	Magnetically induced electric field gradient in the $NpPd_2Ge_2$ compound,	**Piotr Gaczyński**, Eric Colineau, Franck Wastin, Pascal Boulet, and Jean Rebizant, JRC Institut for Transuranium Elements
Th132	Physical properties of $NpRh_2Sn$, a new Np-based ternary compound	**Tomasz Klimczuk**, Jean-Christophe Griveau, Rachel Eloirdi, Eric Colineau and Roberto Caciuffo, Institute for Transuranium Elements
Th133	Imaging the Fano lattice to hidden order transition in URu_2Si_2	**Mohammad H. Hamidian** and Andrew R. Schmidt, Cornell University, Peter Wahl, Max-Planck-Institut für Festkörperforschung, Focko Meier, Cornell University, Alexander V. Balatsky, Los Alamos National Lab, James D. Garrett, Travis J. Williams and Graeme M. Luke, McMaster University, James C. Davis, Cornell University
Th134	The branching ratio of the $N_{4,5}$ edges of URu_2Si_2: electron energy loss spectroscopy	**Jason R. Jeffries** and Kevin T. Moore, Lawrence Livermore National Laboratory, Nicholas P. Butch, University of Maryland, M. Brian Maple, University of California, San Diego
Th135	Visualizing the formation of the Kondo lattice and the hidden order in $U(Ru,Rh)_2Si_2$	**Pegor Aynajian**, Eduardo H. da Silva Neto and Colin V. Parker, Princeton University, Joe D. Thompson, LANL, Yingkai Huang, University of Amsterdam, Abhay Pasupathy, Columbia University, Eric Bauer, LANL, John Mydosh, Leiden University, Ali Yazdani, Princeton university
Th136	BCS superconductivity in quantum critical metals	**Jian-Huang She** and Jan Zaanen, Leiden university