Session 22aC

Ferromagnetism and superconductivity **22aC1**

J. Flouquet[a], A. Huxley[a], I. Fomin[a], J-P. Brison[b], A. Buzdin[c]

[a]*CEA-Grenoble, DRFMC/SPSMS, 38054 Grenoble Cedex 9, France*
[b]*CRTBT-CNRS, 38042 Grenoble Cedex 9, France*
[c]*Centre de Physique Moleculaire Optique et Hertzienne, Universite Bordeaux 1, 33405 Talence, France*

The interplay of ferromagnetism and superconductivity has been examined for conventional s wave superconductors two decades ago. The new feature is the discovery of superconductivity in the ferromagnetic domain of itinerant electrons close to the critical density where long range magnetic order collapses (UGe_2, URhGe, $ZrZn_2$). An appealing proposal is the occurence of unconventional triplet pairing mediated by electronic interactions. New features may occur as spontaneous vortex state, weak link at the interface of magnetic domains...We will review the experimental situation including the normal phase properties and describe the different theoretical proposals.

Magnetism and Unconventional Superconductivity in $Ce_nM_mIn_{3n+2m}$ Heavy-Fermion Crystals **22aC2**

J. D. Thompson[a], M. Nicklas[a], A. Bianchi[a], R. Movshovich[a], A. Llobet[a], W. Bao[a], A. Malinowski[a], M. F. Hundley[a], N. O. Moreno[a], P. G. Pagliuso[a], J. L. Sarrao[a], S. Nakatsuji[b], Z. Fisk[b], E. Lengyl[c], N. Oeshler[c], G. Sparn[c], F. Steglich[c]

[a]*Los Alamos National Laboratory, Los Alamos, NM 87545 USA*
[b]*NHMFL, Florida State University, Tallahassee, FL 32310 USA*
[c]*Max-Planck-Institute for Chemical Physics of Solids, Dresden, D-01187 Germany*

Antiferromagnetism and unconventional superconductivity in the family of heavy-fermion compounds $Ce_nM_mIn_{3n+2m}$ (M=Rh, Ir, Co) are influenced by their layered, tetragonal crystal structure. We review magnetic and superconducting properties of these compounds and evidence for d-wave superconductivity that develops in proximity to antiferromagnetic quantum criticality.

22aC3 New forms of quantum order in strongly interacting electron systems (tentative)

Siddharth S. Saxena

Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, United Kingdom

We have been investigating quantum phase transitions and new forms of quantum order in strongly interacting electron systems at low temperatures, high pressures and high magnetic fields. This work has led to the observation of the first examples of superconductivity in itinerant-electron ferromagnets. The superconducting states observed on the border of magnetism are also poorly understood and would appear to require descriptions beyond that offered by the standard models.

22aC4 Unconventional superconductivity and quasi-2D spin fluctuations in heavy-fermion compounds Ce(Ir, Rh,Co)In_5

G.-q. Zheng[a], K. Tanabe[a], Y. Kawasaki[a], S. Kawasaki[a], Y. Kitaoka[a], Y. Onuki[b], J. Sarrao[c]

[a]*Department of Physical Science, Osaka University, Osaka 560-8531, Japan*
[b]*Department of Physics, Osaka University, Osaka 560, Japan*
[c]*Los Alamos National Lab., NM 87545, USA*

We report extensive NQR studies on the new heavy fermion superconductors Ce(Ir, Rh, Co)In_5. We find that the superconductivity is of unconventional type with line-node gap, and that $CeIrIn_5$ is located in close proximity to the quantum critical point (QCP) with strong quasi-2D magnetic fluctuations. We also find that the increase of T_c by substituting Rh for Ir /Co is due to a change in the magnetic fluctuations and that $CeRh_{0.5}Ir_{0.5}In_5$ and $CeCoIn_5$ sit right on the QCP. Based on these results, we discuss the interrelation between superconductivity and the magnetic fluctuations near the QCP.