Session 26aB

Superconducting Order Parameter of Sr_2RuO_4: an Experimental Overview **26aB1**

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We will give an experimental overview of the current understanding of the symmetry of order parameter of the unconventional superconductor Sr_2RuO_4. We will emphasize the importance of understanding the phenomenon of superconducting double transitions, which is closely linked with an unusual suppresion of the upper critical field for the field accurately parallel to the quasi-two-dimensional planes. We also touch upon the implications of the NMR results in the superconducting symmetry and mechanism.

Determination of the directions of gap nodes in exotic superconductors **26aB2**

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The unconventional superconductivity is characterized by the superconducting gap structure with nodes along certain directions. Although the superconducting gap function is crucial for understanding the pairing mechanism, the detailed structure, especially the direction of the nodes, is an unresolved issue in most of unconventional superconductors. Recently it has been demonstrated that the thermal conductivity κ is a powerful tool for probing the nodal structure. Here we measured κ of spin-triplet Sr_2RuO_4 , quasi-2D heavy fermion $CeCoIn_5$, organic κ-$(BEDT)_2Cu(NCS)_2$, and borocarbide YNi_2B_2C in magnetic field rotating within the basal planes. We show that the gap functions of Sr_2RuO_4, $CeCoIn_5$ and κ-$(BEDT)_2Cu(NCS)_2$ are most likely to be $\boldsymbol{d}(\boldsymbol{k}) = \Delta_0\hat{\boldsymbol{z}}(k_x + ik_y)(\cos ck_z + \alpha)$, $d_{x^2-y^2}$, and d_{xy}, respectively. We also demonstrate the presence of point nodes along the a- and b-axes in YNi_2B_2C.

26aB3 Magnetic excitations in 214-ruthenates

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We discuss magnetic excitations in several 214-ruthenates as observed by inelastic neutron scattering. In the spin-triplet superconductor Sr_2RuO_4 the magnetic excitation spectrum is dominated by incommensurate peaks arising from Fermi surface nesting. Evidence that Sr_2RuO_4 is close to the corresponding spin-density wave ordering is found in the temperature dependence of the spectrum which shows some scaling behavior. The corresponding spin-density wave ordering is finally induced by substituting a small amount of Ru through Ti. The possible role of ferromagnetic fluctuations is further analyzed on the base on Ca-substituted samples which exhibit a strongly enhanced magnetic susceptibility.

26aB4 Tunneling and phase-sensitive studies of the pairing symmetry in Sr_2RuO_4

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We report the results of our tunneling and phase-sensitive experiments on superconducting, single crystalline Sr_2RuO_4. The tunneling measurements revealed a zero-bias conductance peak (ZBCP) in the tunneling spectra originating from Andreev surface bound states, as well as behavior associated with the time-reversal symmetry breaking in Sr_2RuO_4. These results provide strong support for a spin-triplet, *p*-wave superconducting pairing state in Sr_2RuO_4. We will also report the status of the phase sensitive experiments.

26aB5 Competing Orders and Field Induction of D+iD' State

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The role of the magnetic field on the d-wave density wave as a model of pseudogap state of cuprates and on the d-wave superconducting state will be addresses. We argue that in d-wave density state magnetic field can produce secondary gap components. This distortion by magnetic field offers a possibility to distinguish between different scenarios of pseudogap in normal state of high-Tc materials. Similarly we argue that magnetic field can distort the p-wave state and produce secondary component of the gap in p-wave superconductor.