485th ASRC Seminar

Date: 14:00 - 15:00, 12th October
Location: Meeting room 103, ASRC Building
Speaker: Dr. Filip Ronning
(Los Alamos National Laboratory, USA)
Title: Dirty Work in Heavy Fermion Superconductors

Superconductivity in the Ce and Pu-based 115's is strongly believed to have a gap structure with $d_{x^2-y^2}$ symmetry. Impurities are known to be a microscopic probe of strongly correlated materials. We report a globally reversible effect of electronic tuning on the magnetic phase diagram in $CeCoIn_5$ driven by electron (Pt and Sn) and hole (Cd, Hg) doping. Consequently, we are able to extract the superconducting pair breaking component for hole and electron dopants with pressure and co-doping studies, respectively. We find that these nominally non-magnetic dopants have a remarkably weak pair breaking effect for a *d*-wave superconductor. The pair breaking is weaker for hole dopants which induce magnetic moment than for electron dopants. Furthermore, both Pt and Sn doping have a similar effect on superconductivity despite being on different dopant sites, arguing against the notion that superconductivity lives predominantly in the $CeIn_3$ planes of these materials. In addition, we shed qualitatively understanding on the doping dependence with density functional theory calculations.

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Reactions Involving Heavy Nuclei Gr
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