QUANTUM CRITICAL HEAVY FERMION COMPOUNDS

Charles University, Prague
Joint seminar of the Department of Condensed Matter Physics (DCMP)
and the Magnetism and Low Temperature Laboratories (MLTL)

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2:30 PM

Where: Lecture room F2
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Ke Karlovu 5, Prague 2

Abstract: Quantum criticality has emerged as key organizing principle for electrons in strongly correlated systems. Heavy fermion compounds are at the forefront of this research. In recent years efforts are being made to classify the different kinds of quantum critical behavior experimentally observed, to test the extent to which heavy fermion quantum criticality is universal. We have identified a cubic heavy fermion material, Ce3Pd20Si6, as exhibiting a field-induced quantum critical point (QCP) as the lower of two consecutive phase transitions is suppressed to zero. It is accompanied by an abrupt change of Fermi surface [1], reminiscent of what happens across the field-induced antiferromagnetic to paramagnetic transition in tetragonal YbRh2Si2 [2]. In Ce3Pd20Si6, the QCP separates two different ordered phases. In fact, a Kondo breakdown QCP [3] has been theoretically predicted to exist in the ordered portion of a global phase diagram for quantum critical heavy fermion compounds [4]. We conclude that dimensionality is an effective way to tune through such a global phase diagram and that cubic materials [5] are situated in the barely explored three-dimensional portion of this phase diagram.

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