Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Magnetic-field induced quantum critical points of valence transition in Ce- and Yb-based heavy fermions SHINJI WATANABE, University of Tokyo, ATSUSHI TSURUTA, KAZUMASA MIYAKE, Osaka University, JACQUES FLOUQUET, CEA Grenoble — Valence instability and its critical fluctuations have attracted much attention recently in the heavy-electron systems. Valence fluctuations are essentially charge fluctuations, and it is highly non-trivial how the quantum critical point (QCP) as well as the critical end point is controlled by the magnetic field. To clarify this fundamental issue, we have studied the mechanism of how the critical points of the first-order valence transitions are controlled by the magnetic field [1]. We show that the critical temperature is suppressed to be the QCP by the magnetic field and unexpectedly the QCP exhibits nonmonotonic field dependence in the ground-state phase diagram, giving rise to emergence of metamagnetism even in the intermediate valence-crossover regime. The driving force of the field-induced QCP is clarified to be a cooperative phenomenon of Zeeman effect and Kondo effect, which creates a distinct energy scale from the Kondo temperature. This mechanism explains a peculiar magnetic response in $CeIrIn_5$ and metamagnetic transition in $YbXCu_4$for X=In as well as a sharp contrast between X=Ag and Cd. We present the novel phenomena under the magnetic field to discuss significance of the proximity of the critical points of the first-order valence transition. [1] S. Watanabe et al. PRL**100**, (2008) 236401.

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Date submitted: 21 Nov 2008 Electronic form version 1.4