SEMINAIRE DE LA MATIERE CONDENSEE

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Tuning magnetic quantum phase transitions

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Salle de conférence 15 – Bâtiment 563

Quantum phase transitions can be tuned by a non-thermal control parameter such as pressure, magnetic field, or chemical composition. In the canonical quantum-critical heavy-fermion system (HFS) $CeCu_{6-x}Au_x$, a quantum critical point (QCP) can be obtained as a function of Au concentration at $x_c = 0.1$ or, for $x > x_c$, by hydrostatic pressure or magnetic field. The different behavior of field tuning vs. composition tuning of the QCP, evidenced by specific heat and resistivity measurements, is corroborated by inelastic neutron scattering experiments probing critical fluctuations [1]. This may indicate that the (B,x,p) phase diagram for $T \rightarrow 0$ may exhibit several distinct phases. The Kondo temperature determined by ultraviolet photoelectron spectroscopy exhibits a distinct step near x_c, suggestive of a loss of complete Kondo screening [2]. Implications for QCP models for HFS will be discussed. - Uniaxial stress imposed on epitaxially grown $LaCoO_3$ films leads to the stabilization of a high-spin state, as opposed to bulk $LaCoO_3$ which is non-magnetic with S = 0 for $T \rightarrow 0$. Unexpectedly, ferromagnetism with T_C up to 80 K is observed in epitaxial films whose properties can be "strain-tuned" by choosing different substrates [3].

[1] O. Stockert et al., Phys. Rev. Lett. **99**, 237203 (2007)
[2] M. Klein et al., Phys. Rev. Lett. **101**, 266404 (2008)
[3] D. Fuchs et al., Phys. Rev. B **75**, 144402 (2007); B **77**, 014434 (2008)

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