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## Einladung zum Seminar

**Piers Coleman**

Center for Materials Theory, Rutgers University

### " Qu-transitions: probing the critical zero point fluctuations of matter with heavy electron materials. "

This seminar will describe the playground for new insights into the nature of "qu-transitions"- quantum phase transitions provided by heavy fermion physics.

Last century, physicists were profoundly shaken by the discovery of universal power-law correlations at thermal second-order phase transitions. Today, our understanding of phase transitions enters the quantum era with the discovery of quantum phase transitions: phase transitions at absolute zero driven by the violent jiggings of quantum zero-point motion squeezed out to macroscopic dimensions. These transitions occur in a wide range of materials, including ferromagnets, helium-3, ferro-electrics, heavy electron and high temperature superconductors, and they profoundly alter the properties of a material. While a distant cousin of classical criticality, quantum criticality is closer in spirit to the Casimir effect of the electromagnetic vacuum, the extra fermionic dimension of metals converts this into a major unsolved physics problem.

I'll talk about, and add my perspective on the some of the key questions, illustrating them with experimental data. In particular:

Does the electron break up at quantum critical point ?

Can quantum critical points become qu-phases?

and of course -

Is quantum criticality the breeding ground for high temperature superconductivity?

Host: S. Bühler-Paschen

**Mittwoch, 28. Jänner 2009, 16:30 Uhr**  
**Seminarraum 138B, 7. OG, Turm C (rot)**  
**Wiedner Hauptstraße 8-10**  
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