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Quantum criticality and Fermi surface topology in $CeRhIn_5$ H.Q. YUAN, L. JIAO, J.L. ZHANG, Department of Physics, Zhejiang University, Y. KOHAMA, M. JAIME, J. SINGLETON, E.D. BAUER, HAN-OH LEE, T. PARK, J.D. THOMPSON, Los Alamos National Laboratory — In the heavy fermion compound $CeRhIn_5$, superconductivity occurs upon partially suppressing the antiferromagnetic state via applying pressure. At the quantum critical point (p_c=2.3GPa), observations of a Fermi surface change from a small Fermi volume to a large one [1] seems to favor the scenario of local quantum criticality [2]. In this talk, we will present the first experimental evidence of a magnetic field induced quantum phase transition in $CeRhIn_5$ by measuring the ac specific heat and the de Hass van Alphen effect using the facilities of pulsed magnetic field at Los Alamos. The antiferromagnetic transition of $CeRhIn_5$ is eventually suppressed at a critical field of $H_c \simeq 50$ T. A dramatic change of the Fermi surface is found close to H_c, but still on the antiferromagnetic side. At sufficiently low temperatures, the Fermi surface in the antiferromagnetic state undergo a topological change from a small Fermi volume to a large one with increasing magnetic field, the latter being kept unchanged in the paramagnetic state at fields above H_c. These findings seem to support a different scenario for the field induced quantum phase transition in $CeRhIn_5$, e.g., the spin-density-wave-type quantum criticality. [1] H. Shishido et. al., J. Phys. Soc. Jpn. 74, 1103 (2005). [2] Q. Si et al., Nature 413, 804 (2001).

Huiqiu Yuan
Zhejiang University

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