HIGH MAGNETIC FIELD MAGNETIZATION OF CeIn₃

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A number of antiferromagnetic heavy fermion compounds are known to exhibit a quantum critical point when the Neel transition into the ordered state is depressed to zero temperature. This is more typically done with pressure, or with doping, but a particularly novel realization of such a quantum critical point can be made with a magnetic field. The material of interest, CeIn₃, is the archetypal cubic heavy fermion antiferromagnetic. Since the consequences of quantum criticality are sensitive to the dimensionality of the material, CeIn₃ is a material of particular importance. We have recently realized a magnetic-field induced quantum critical point in fields of excess of 60 T in this material, where the effective mass is seen to increase gradually with field, concentrated in regions that we call hot spots on the Fermi surface. During 2004, some additional measurements of the de Haas-van Alphen effect and magnetization were required up to fields of 65 T in order to obtain a more complete study worthy of publication. Figure 1a shows an example of the magnetization of CeIn₃ measured in the 65 T magnet, which reveals the magnetization to be approaching saturation. Figure 1b shows examples of the de Haas-van Alphen effect along two different orientations.

Fig 1 (a) Magnetization of CeIn₃. (b) Pulsed field de Haas-van Alphen effect data in CeIn₃.

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References