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The non-centrosymmetric heavy fermion ferromagnet $Sm_2Fe_{12}P_7$[1]

MARC JANOSCHEK, RYAN E. BAUMBACH, JAMES J. HAMLIN, IVY K. LUM, M. BRIAN MAPLE, University of California, San Diego — The investigation of quantum critical points (QCPs) in heavy fermion compounds (HF) has proven to be a useful tool in gaining insight into strongly correlated electron physics. However, the body of work on HF systems mainly focuses on antiferromagnetic QCPs. We report measurements of the electrical resistivity, magnetization and specific heat on single crystals of the non- centrosymmetric compound $Sm_2Fe_{12}P_7$, that exhibits ferromagnetic (FM) order below $T_{M,1} = 6.3$ K. The ratio of the effective magnetic moment in the paramagnetic state, to the saturation magnetic moment in the ordered state indicates that the ordered state is associated with itinerant electrons. An enhanced value for the coefficient of the electronic speci?c heat $\gamma \sim 450$ mJ mol^{-1}K^{-1} is observed, that is accompanied by a large coefficient A of the T^2 term in the electrical resistivity, suggesting a HF ground state. Three consecutive magnetic phase transitions, indicative of competing magnetic energy scales, and the observation of a metamagnetic transition additionally suggest proximity to a QCP. Thus, we propose that $Sm_2Fe_{12}P_7$ is a possible candidate to study a FM QCP in a HF compound.

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