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Giant Magnetoresistance and Unusual Magnetic Behavior in Single Crystals of the Layered Arsenide $EuRh_2As_2$ YOGESH SINGH, D.C. JOHNSTON, Ames Laboratory & Dept. of Phys. & Astron., Iowa State Univ., Ames IA 50011 — Magnetic susceptibility χ, isothermal magnetization M, resistivity ρ, Hall effect, and heat capacity C measurements on $EuRh_2As_2$ reveal complex and unusual magnetic behavior. The $\chi(T)$ data gave a small Weiss temperature $\theta \approx 12$ K indicating predominantly ferromagnetic interactions between the Eu^{2+} moments. Below $T = 47$ K, however $\chi(T)$ indicates that an antiferromagnetic transition occurs instead. The unusually high T_N compared to θ ($\theta/T_N \approx 0.26$) suggests novel physics. A metamagnetic transition is observed in the M versus H data at $T < T_N$ when H is applied in the ab plane. The metamagnetic field shows an unusual T dependence, decreasing slightly between $T = 2$ K and 30 K and increasing again on approaching T_N before vanishing abruptly at T_N. In zero field the $\rho(T)$ data indicate metallic behavior between 2 K and 300 K. However, at low temperatures $T \leq 30$ K, $\rho(T)$ increases dramatically in an applied field H and we observe a giant positive magnetoresistance of $\approx 90\%$ at $T = 2$ K and $H = 8$ T. For $T < 30$ K $\rho(T)$ increases for $H \geq 1$ T. A monotonic reduction of the electronic specific heat coefficient γ with H and a change in sign of the Hall coefficient from negative above $T = 15$ K to positive for lower T are also observed.
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