Non-Fermi-liquid behavior in nearly ferromagnetic SrIrO$_3$ single crystals

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We report magnetic, electric transport, and calorimetric properties of single-crystal SrIrO$_3$ as a function of temperature $T$ and applied magnetic field $H$. We find that SrIrO$_3$ is a non-Fermi-liquid metal near a ferromagnetic instability, as characterized by the following properties: (1) small saturation moment and no evidence for long-range order down to 1.7 K, (2) strongly enhanced magnetic susceptibility that diverges as $T^{\gamma}$ at low temperatures with $1/2 < \gamma < 1$, depending on the applied field, (3) heat capacity $C(T,H) \sim -T\ln T$ that is readily enhanced in low applied fields, and (4) $T^{3/2}$ dependence of electrical resistivity over the range 1.7 K $< T <$ 120 K. The data imply SrIrO$_3$ is a rare example of a stoichiometric oxide compound that exhibits non-Fermi-liquid behavior near a quantum critical point ($T=0$ and $\mu_0H=0.23$ T). The results will be presented and discussed along with those of a similar system CaRuO$_3$.

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