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Magnetic properties of $\text{RFe}_2\text{Zn}_{20}$ ($\text{R} = \text{Y, Gd} - \text{Lu}$): $4f$ moments embedded in strongly correlated electron host SHUANG JIA, NI NI, A. SAFA-SEFAT, S.L. BUD'KO, P.C. CANFIELD, Ames Laboratory, USDOE and Department of Physics and Astronomy, Iowa State University, HYUNJIN KO, Ames Laboratory, USDOE and Department of Chemistry, Iowa State University — The $\text{RFe}_2\text{Zn}_{20}$ series of compounds manifest varied magnetic properties, from near ferromagnetism ($\text{R} = \text{Y, Lu}$), to enhanced ferromagnetic (FM) ordering of local moments ($\text{R} = \text{Gd to Tm}$), to heavy Fermi ground state ($\text{R} = \text{Yb}$). Thermodynamic and transport measurement results reveal that these varied magnetic states can be understood in the framework of $4f$ moments embedded in a nearly ferromagnetic Fermi liquid. In such a highly polarizable electronic host, the different type of $4f$ moments, null moments for Y^{3+} and Lu^{3+} , pure spin- contributed Gd^{3+} , spin-orbital-coupling contributed Tb^{3+} to Tm^{3+} , and the hybridized Yb ions, correlated with the itinerant electrons, lead to this magnetic versatility. For local moment members ($\text{R} = \text{Gd to Tm}$), the Curie temperatures roughly scale with the de Gennes parameter, indicating negligible crystal electric field (CEF) effect on the magnetic ordering, although the CEF on the $4f$ local moments leads to anisotropic FM ground state for $\text{R} = \text{Tb to Tm}$. For hybridized moment member ($\text{R} = \text{Yb}$), the Kondo temperature seems to be enhanced, associated with the electronic host.

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