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Magnetic phase diagram of RFe_4Al_8 (R=Dy,Gd,Lu) single crystals M. ANGST, A. KREYSSIG, A.I. GOLDMAN, P.C. CANFIELD, Ames Laboratory USDOE and Department of Physics and Astronomy, Iowa State University, Ames, IA — Single crystals of RFe_4Al_8 (R=Dy,Gd,Lu) were grown using self-flux at high temperatures T and investigated by magnetization, electrical transport, and x-ray measurements. Crystals grow typically in form of long needles ($\|[001]$) with facets $\perp[110]$ and good crystallinity. Iron moments order below $T_N \approx 175\,\mathrm{K}$ (R=Dy), 150 K (R=Gd) and 195 K (R=Lu). Measurements on $LuFe_4Al_8$ indicate that fields H up to 7 T do not noticeably shift T_N. There is no clear signature of Dy moment ordering at lower T, in zero field. However, there is evidence of a metamagnetic transition (likely first order) to a low T high H ($\perp[001]$) ferrimagnetic phase, attributed to Dy ordering. Gd moments order via a first order transition at about 30 K ($H = 0$). The transition is shifted to lower T by applying $H\|[001]$ (to zero temperature in about 1 T). The resistivity along [001] jumps to a higher value below the transition. The $H - T$ phase diagrams as well as the need for the microscopic determination of the magnetic structure will be discussed.

M. Angst
Ames Laboratory

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