

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Possible Kondo-Lattice-Enhanced Magnetic Ordering at Anomally High Temperature in Nd Metal under Extreme Compression**<sup>1</sup>

JAMES S. SCHILLING, JING SONG, VIKAS SONI, JINHYUK LIM, Washington University in St. Louis — Most elemental lanthanides order magnetically at temperatures  $T_o$  well below ambient, the highest being 292 K for Gd. Sufficiently high pressure is expected to destabilize the well localized magnetic  $4f$  state of the heavy lanthanides, leading to increasing influence of Kondo physics on the RKKY interaction. For pressures above 80 GPa,  $T_o$  for Dy and Tb begins to increase dramatically, extrapolating for Dy to a record-high value near 400 K at 160 GPa.<sup>2</sup> This anomalous increase may be an heretofore unrecognized feature of the Kondo lattice state; if so, one would expect  $T_o$  to pass through a maximum and fall rapidly at even higher pressures. A parallel is suggested to the ferromagnet CeRh<sub>3</sub>B<sub>2</sub> where  $T_o = 115$  K at ambient pressure, a temperature more than 100-times higher than anticipated from simple de Gennes scaling.<sup>3</sup> Here we discuss recent experiments on Nd where anomalous behavior in  $T_o(P)$  is found to occur at lower pressures, perhaps reflecting the fact that Nd's  $4f$  wave function is less localized.

<sup>1</sup>Work at Washington University is supported by NSF grant DMR-1104742 and CDAC through NNSA/DOE grant DE-FC52-08NA28554.

<sup>2</sup>J. Lim G. Fabbri, D. Haskel, J. S. Schilling, Phys. Rev. B 91, 045116 174428 (2015).

<sup>3</sup>S. A. Shaheen, J. S. Schilling, R. N. Shelton, Phys. Rev. B 31, 656(R) (1985).

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