Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Studies of magnetism in dysprosium under extreme pressures WENLI BI, ERCAN ALP, Argonne Natl Lab, JING SONG, YUHANG DENG, Washington University in St. Louis, JIYONG ZHAO, MICHAEL HU, DANIEL HASKEL, Argonne Natl Lab, JAMES S. SCHILLING, Washington University in St. Louis, ANL, IXN TEAM, ANL, MM COLLABORATION, WASHU COLLABORATION — The magnetism and valence of dysprosium have been investigated under high pressure up to 141 GPa using synchrotron Mössbauer spectroscopy and x-ray absorption near edge structure (XANES). At ambient pressure Dy exhibits two types of magnetic ordering, antiferromagnetic ordering at 178 K followed by ferromagnetic ordering at 85 K. At 10 K the hyperfine magnetic field of Dy remains almost constant with increasing pressure to 141 GPa, showing the robustness of the magnetism, in contrast to Eu where pressure induces drastic changes in magnetism [1]. Above 1 Mbar the magnetic ordering temperature increases drastically with increasing pressure. At 141 GPa the magnetic ordering temperature is revealed to be higher than 230 K, in good agreement with previous electrical resistivity studies [2]. XANES experiments to 115 GPa find that Dy remains trivalent. [1]. W. Bi, J. Lim, G. Fabbris, J. Zhao, D. Haskel, E.E. Alp, M.Y. Hu, P. Chow, Y. Xiao, W. Xu, and J.S. Schilling, Phys. Rev. B 93, 184424 (2016). [2] J. Lim, G. Fabbris, D. Haskel, and J.S. Schilling, Phys. Rev. B 91, 45116 (2015).

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Date submitted: 11 Nov 2016 Electronic form version 1.4