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Longitudinal Field μSR Study of Spin Dynamics and Onset of Magnetic Correlations in $LiHo_xY_{1-x}F_4$[1] K. CHEN, R.C. JOHNSON, Boston College, S.R. GIBLIN, J.S. LORD, Rutherford Appleton Laboratory, A. AMATO, C. BAINES, Paul Scherrer Institute, A. LASCIALFARI, University of Pavia, A.M. TKACHUK, St. Petersburg State University of Information Technology, B. BARBARA, Neel Institute, B.Z. MALKIN, Kazan State University, M.J. GRAF, Boston College — Nanomagnets - non-interacting spins typically imbedded in a solid host material - are intensely studied for applications ranging from high density data storage to quantum computing. We are studying the magnetic ion Ho^{3+} spin dynamics in $LiHo_xY_{1-x}F_4$ in the dilute limit ($x << 1$) using the muon spin relaxation in applied longitudinal magnetic fields as a function of temperature and magnetic field strength. At low concentrations ($x \leq 0.01$) and for all magnetic field values studied, the spin lattice relaxation rate, $1/T_1$, shows a characteristic peak, usually associated with relaxation by spin fluctuations, near $T = 10$ K; this peak is consistent with the single-ion energy level diagram of Ho^{3+}. At larger x this peak is lost in low fields; stronger fields (> 600 G) restore the peak but show qualitatively different low temperature behavior. This suggests that both magnetic disorder and Ho-Ho interactions play an increasingly important role at larger x values.

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