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Random Field Effects in the Transverse Field Ising Spin-Glass $LiHo_xY_{1-x}F_4$ Magnetic Material. S.M. ALI TABEI, MICHEL J.P. GINGRAS, Department of Physics, University of Waterloo — Magnetic $LiHo_xY_{1-x}F_4$ in a transverse field has attracted a lot of attention recently because it is an ideal system to study quantum effects in disordered systems. When a magnetic field is applied transversely to the Ising magnetic moments in $LiHo_xY_{1-x}F_4$, the field-induced transition behaves quite differently from theoretical expectations. For $x = 0.167$ a paramagnet to spin glass transition has been studied experimentally in some detail. In particular,experiments find that the cusp in the nonlinear susceptibility signaling the glass state decreases in size as the temperature is lowered and the critical transverse field increases. We will show that the combination of applied transverse field and random off-diagonal dipolar interactions lead to random longitudinal field in $LiHo_xY_{1-x}F_4$. Using a simple model, we will show how this random field phenomenology accounts semi-quantitatively for the behavior of the nonlinear susceptibility in $LiHo_xY_{1-x}F_4$.

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