Investigation of magnetization and magnetostriction in lithium – ytterbium tetrafluoride

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Lithium – rare earth tetrafluorides (or, double fluorides) $LiRF_4$ (R is a rare-earth element) are model objects of the physics of dipolar magnetism. Scheelite type $I4_1/a$ crystal symmetry presents a slightly-distorted diamond-like arrangement of rare earth ions, which is suitable for study of order-by-disorder magnetic phenomena. $LiYbF_4$ is XY-dipolar antiferromagnet, $T_N = 0.130$ K, magnetic moments are ordering in (001) plane [1, 2, 3].

Single crystals were grown using Bridgeman-Stockbarger method, powder sample was synthesized by sintering powders of LiF and YbF_3 in proportions from to the phase diagram [4]. Static magnetostriction measurements were performed on a home-made capacitive dilatometer [5] at high fields (up to 9 T) and low temperatures (down to 2 K). Magnetization was measured by vibration sample magnetometer *VSM* at *PPMS* system. Theoretical analysis makes use of Yb^{3+} ion Hamiltonian, diagonalized in the full space of the energy states of $4f^{13}$ electronic configuration [6].

Experimental data and simulations agree both qualitatively and quantitatively for the powder sample as well as for the single crystal samples. Also, our theoretical approach explains $LiYbF_4$ single crystal inverse susceptibility experimental data from [3] better than the original calculations.

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