Magnetic Phase Diagram of ErB_4 under High Pressure

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Frustrated magnetic systems have attracted widespread interest in the last years due to discoveries of various new types of complex quantum ground states [1]. The interest in such systems is, in particular, related with magnetization plateaus at fractional values of saturation magnetization. It was shown that rare earth tetraborides (REB_4) represent 2D frustrated magnets on the Shastry-Sutherland lattice (SSL) which are relatively easy and fully accessible for experiments up to the saturation magnetic field. Probably the most studied among tetraborides is TmB_4, which exhibits a rich phase diagram as a function of temperature and field [2,3]. In this work we will study another interesting tetraboride ErB_4 with SSL. Using piston-cylinder pressure cell we have applied hydrostatic pressure up to 3 GPa and by measuring electrical resistivity we constructed the phase diagram of ErB_4. Temperature and magnetic field dependences of resistance at various pressures were measured in temperature range between 1.8 K and 20 K and in magnetic fields up to 6 T. The obtained results exhibit shifts of ordering temperatures T_N as well as shifts of boundaries between different magnetic phases. The effect of pressure on various interactions between magnetic ions in this compound is discussed and compared with the previous results obtained on TmB_4 [4].

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