

## Magnetic ordering in $\text{Er}_2\text{Ti}_2\text{O}_7$ and elastic softening in $\text{Tb}_2\text{Ti}_2\text{O}_7$

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**ABSTRACT:** Geometric frustration occurs in the rare earth pyrochlores due to magnetic rare earth ions occupying the vertices of the network of corner-sharing tetrahedra. In this research, we have two parts. In the first one we study the phase transition to the magnetically ordered state at low temperature in the pyrochlore  $\text{Er}_2\text{Ti}_2\text{O}_7$ . The molecular field method was used to solve this problem. The second part, we analysis the crystal electric field Hamiltonian for the rare earth sites. The rather large degeneracy of the angular momentum  $J$  of the rare earth ion is lifted by the crystal electric field due to the neighboring ions in the crystal. By rewriting the Steven operators in HCEF in terms of charge quadrupole operators, we can identify unstable parameters in HCEF. These may be related to lattice instabilities in  $\text{Tb}_2\text{Ti}_2\text{O}_7$ .

**ALL ARE WELCOME!!!**