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Investigating the magnetic structure and anisotropic Pr-Fe exchange interaction in a $\text{PrFe}_3(\text{BO}_3)_4$ single crystal by optical spectroscopy

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Abstract

Optical spectroscopy was used to obtain information on the energy and symmetry of the crystal-field (CF) levels within the $4f^2$ configuration of Pr^{3+} in $\text{PrFe}_3(\text{BO}_3)_4$, along with changes in the frequencies and intensities of the f-f transition lines upon magnetic ordering ($T_N = 32\text{K}$). Analysis of the experimental data yielded the values of the parameters for the CF and the anisotropic Pr^{3+} - Fe^{3+} exchange-interaction Hamiltonians. © 2010 Allerton Press, Inc.

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