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Title:	Multiple phase transitions and high-field quadrupolar order in a model for β − TeVO 4
Authors:	Singhania, A. (/jspui/browse?type=author&value=Singhania%2C+A.) Kumar, Sanjeev (/jspui/browse?type=author&value=Kumar%2C+Sanjeev)
Keywords:	Heisenberg model Applied field Vector chirality
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Abstract:	Motivated by the complex behavior of the frustrated magnet β − TeVO 4 , we study an anisotropic Heisenberg model for coupled spin- 1 / 2 zigzag chains. Using a cluster mean field approach to capture quantum correlations we find, upon reducing temperature in the absence of applied field, (i) a partially ordered state, (ii) a collinear antiferromagnetic phase, and (iii) an elliptical spiral state characterized by finite vector chirality. For finite fields we find a metamagnetic response close to saturation magnetization. We show via explicit calculations that the quadrupolar order parameter is finite in the metamagnetic regime. The exchange parameters reported in the ab initio study of β − TeVO 4 are used in our study. We compare our results with those reported in recent experiments on β − TeVO 4 and highlight similarities as well as differences between experimental results and our cluster mean field calculations.
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