

**Application of a frustrated Ising model in an analysis of
low-temperature phase transitions in $LiCsSO_4$**

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Empirical data, concerning three successive low-temperature structural transformations in $LiCsSO_4$, are reported. The data indicate existence of incommensurate modulations, which appear as intermediate phases at the transitions and are most possibly associated with planar rotations of SO_4 tetrahedrons. This kind of behaviour is characteristic for the family of $A'A''BX_4$ compounds. A new interpretation of the phenomenon is proposed, based on the Kurzyński and Halawa model of structural phase transitions in $A'A''BX_4$ compounds [1,2] which, in the low-temperature region, can be effectively reduced to the one-spin frustrated Ising (ANNNI) model[3]. The originally three-dimensional model is mapped onto (010) axis, perpendicular to the basal hexagonal planes. The incommensurate (010) modulation turns out to be a result of the frustrating competition between in-plane nn and out-plane nmn vs. $nnnn$ interactions.

References

- [1] M. Kurzyński, Phase Transitions 52,1-56(1994)
- [2] M. Kurzyński and M. Halawa Phys. Rev. B34,4846(1986)
- [3] I. Luk'yanchuk, A. Jorio, M. A. Pimenta, Phys. Rev. B57(9)5086(1998)

← 13.4 cm →

Subject category :

2. Quantum and Classical Spin Systems

Presentation mode :

poster

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9.7 cm