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VERTEX MODELS FOR 2d SPIN ICE

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Abstract:

In natural spin-ice samples, the lattice structure, spin nature and interactions entail frustration and a number of peculiar static and dynamic properties. Recently, artificial spin ice samples (ASI) with a square bi-dimensional lattice structure and Ising like spins sitting on the edges have been manufactured and are currently being studied by different groups. In particular, questions on the equilibration of the samples after different preparation protocols have been raised.

We used a sixteen vertex model (in which dipolar interactions beyond nearest-neighbour spins are neglected) to model ASI. In this talk I will summarize our main analytic and numerical results on the static and dynamic properties of the model. Comparison to experimental data will also be made.

More details on our results can be found in: Thermal phase transitions in Artificial Spin-Ice, Demian Levis, Leticia F. Cugliandolo, Laura Foini, Marco Tarzia, arXiv:1302.3725.

Static properties of 2D spin-ice as a sixteen-vertex model, Laura Foini, Demian Levis, Marco Tarzia, Leticia F. Cugliandolo, arXiv:1210.8361, J. Stat. Mech. P02026 (2013).

Out of equilibrium dynamics in the bidimensional spin-ice model, Demian Levis, Leticia F. Cugliandolo, arXiv:1107.2528, EPL 97, 30002 (2012).