Bocconi

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Room 2-E4-SR03
Via Röntgen 1, Milan, 2° floor

Critical exponents of the spin glass transition in a field at zero temperature

Speaker
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Abstract

Understanding the spin glass transition in finite dimensions has been a major challenge since the Edwards-Anderson model was introduced. While progress has been made in zero external field, the case with a field is still puzzling. Numerical simulations face slow equilibration problems, and the associated Field Theory is complicated by the Replica structure. A method called the "Bethe M-layer construction" has been developed to compute perturbative expansions for observables, where the leading order corresponds to the (mean-field) behavior on the Bethe lattice, and corrections arise from the effect of "manually added" topological loops. This method has been tested on well-known problems, such as the Ising model and site/bond percolation, confirming its validity and setting the stage for its use in calculating critical exponents. However, the key application of this method has been to disordered systems, most notably the spin glass model with an external field at zero temperature, revealing a new stable fixed point and estimating non-mean-field critical exponents through the epsilon-expansion, for both short-range models below the upper critical dimension and corresponding long-range one dimensional models.

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