Poster-2-24

Identification of a non-conformal chiral transition in various 2D classical models with CTMRG

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Using the corner-transfer matrix renormalisation group approach for classical systems, we revisit the melting of period-p phases in the presence of a chiral perturbation, a problem on which Monte Carlo simulations have not been able to reach definitive conclusions. It was first predicted by Huse and Fisher that such a melting could occur via a unique chiral transition characterised by equal correlation length and incommensurability exponents, namely $\nu_x = \beta$, and by anisotropic scaling, with an anisotropy exponent z (the equivalent of the dynamical exponent) different from 1. First, we revisit the p=3 case with the three-state chiral Potts model [1] and show that, close to the Potts point, the melting occurs via a chiral transition with an anisotropy exponent $z = 3/2$. We then move to the p=4 case by studying the chiral Ashkin-Teller model [2], for which we show that a chiral transition is present if the coupling of the 4-spin term lambda is large enough. Finally, we show that CTMRG is also very powerful to map out the properties of the hard-square model away from the integrable lines solved by Baxter.

[1] "Identifying the Huse-Fisher universality class of the three-state chiral Potts model", Samuel Nyckees, Jeanne Colbois and Frédéric Mila, Nuclear Physics B, Vol. 965, April 2021, 115365.

[2] "Commensurate-incommensurate transition in the chiral Ashkin-Teller model", Samuel Nyckees and Frédéric Mila, Phys. Rev. Research 4, 013093, February 2022.