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A distant descendant of the six-vertex model

Thursday 25 January 2024 18:15 (1 hour)

In this talk I present a new solution of the star-triangle relation having positive Boltzmann weights. The solution defines an exactly solvable two-dimensional Ising-type (edge interaction) model of statistical mechanics where the local spin variables" can take arbitrary integer values, i.e., the number of possible spin states at each site of the lattice is infinite. There is also an equivalentdual" formulation of the model, where the spins take continuous real values on the circle. From algebraic point of view this model is closely related to the to the 6-vertex model. It is connected with the construction of an intertwiner for two infinite-dimensional representations of the quantum affine algebra $U_q\big(\widehat{sl}(2)\big)$ without the highest and lowest weights. The partition function of the model in the large lattice limit is calculated by the inversion relation method. Amazingly, it coincides with the partition function of the off-critical 8-vertex free-fermion model. A connection of the model to a surface roughening transition as well as its possible interpretation as a Berezinskii-Kosterlitz-Thouless transition is briefly discussed. This talk is based on recent paper with Sergey Sergeev arXiv:2310.08427 .

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