

Quantum and classical spin systems linked by a common random loop model

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Mathematical analysis of the thermal states of a class of quantum spin chains leads to random loop ensembles with a strong connection to classical spin models of statistical mechanics in $(d+1)$ dimensions. We shall present this correspondence and use it to establish symmetry breaking in the ground states of a family of antiferromagnetic quantum spin chains, and highlight its mathematical relation with the phase transition of classical Q -state Potts models in two dimensions. We find that through their common stochastic geometry, quantum and classical spin systems are best understood when analyzed together.

Joint work with H. Duminil-Copin and S. Warzel, with relation to recent results of A. Glazman - R.Peled, and G. Ray - Y. Spinka.