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Invisible states Potts model

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The Potts model with invisible states was introduced to explain discrepancies between theoretical predictions and experimental observations of phase transitions in some systems where Zq symmetry is spontaneously broken [1]. It differs from the ordinary q-state Potts model in that each spin, besides the usual q visible states, can be also in any of r so-called invisible states. Spins in an invisible state do not interact with their neighbours but they do contribute to the entropy of the system. As a consequence, an increase in r may cause a phase transition to change from second to first order. Potts models with invisible states describe a number of systems of interest in physics and beyond and have been treated by various tools of statistical and mathematical physics. We aim to give a review of this fundamental topic based on our results [2-4]. Mainly, our goal was to investigate the energy-entropy interplay influence on the phase transition in the Potts model with invisible states in 1D case [2] as well as on different graph topologies [3].

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