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Free energy density in one-dimensional spin chains

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I talk about free energy density for mean field perturbation of states of a one-dimensional spin chain, which is a joint work with Mosonyi, Ohno and Petz in Rev. Math. Phys. 20 (2008). This is a generalization of the former work of Petz, Raggio and Verbeure (1989) for product states to the case for Gibbs-KMS equilibrium states, and was motivated by a recent development of large deviations in spin chains. I show the existence of the functional free energy density and its variational expression when the reference state is the Gibbs state for a translation-invariant interaction of finite range. I further explain the free energy density from the viewpoints of large deviations (fully obtained by Ogata) and the conjecture due to Bessis, Moussa and Villani (BMV-conjecture).

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