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WORKSHOP ON QUANTUM INFORMATION IN QUANTUM MANY-BODY PHYSICS
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Quantum Hammersley-Clifford theroem

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I discuss whether the the Hammersley-Clifford theorem, which holds that a positive probability distribution is a Markov network if and only if it is factorizable over the cliques of its underlying graph, can be generalized to positive quantum states. I show that the answer is affirmative when the underlying graph contains at most two-vertex cliques and a counter-example can be constructed on a graph containing three-vertex cliques. As a corollary, a class of pure states satisfying an entanglement area law can be shown to be PEPS of constant bond dimension.

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