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Title: A fast renormalization group decoding algorithm for topological quantum codes

Abstract: I will present a family of algorithms, combining real-space renormalization methods and belief propagation, to estimate the free energy of a topologically ordered system in the presence of defects. Such an algorithm is needed to preserve the quantum information stored in the ground space of a topologically ordered system and to decode topological error-correcting codes. For a system of linear size L , our algorithm runs in time $\log(L)$ compared to L^6 needed for the minimum-weight perfect matching algorithm previously used in this context and achieves a higher depolarizing error threshold.