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Loop optimization for tensor network renormalization[1] SHUO YANG, Perimeter Institute for Theoretical Physics, ZHENG-CHENG GU, The Chinese University of Hong Kong, XIAO-GANG WEN, Massachusetts Institute of Technology — We introduce a tensor renormalization group scheme for coarse-graining a two-dimensional tensor network, which can be successfully applied to both classical and quantum systems on and off criticality. The key idea of our scheme is to deform a 2D tensor network into small loops and then optimize tensors on each loop. In this way we remove short-range entanglement at each iteration step, and significantly improve the accuracy and stability of the renormalization flow. We demonstrate our algorithm in the classical Ising model and a frustrated 2D quantum model.

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