

Renormalization of tensor network states

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Progress in the development and application of the tensor renormalization group for two or three dimensional statistical and quantum lattice models is reviewed. Emphasis is given to the coarse graining tensor renormalization group method using the higher-order singular value decomposition (HOTRG) and the projected entangled simplex representation for the ground state wave function of quantum lattice models. The HOTRG provides an accurate but low computational cost technique for studying both classical and quantum lattice models in two or three dimensions. The projected entangled simplex state (PESS), on the other hand, provides a good representation of tensor network states for highly frustrated quantum lattice models. The PESS extends the pair correlation in the projected entangled pair states (PEPS) to a simplex.