

A Quasiparticle Excitation Ansatz for 2D Isometric Tensor Network States

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Isometric Tensor Network States (isoTNS) in 2D were introduced as a subclass to PEPS with additional isometry conditions that allow for an efficient evaluation of local expectation values [1]. Based on a formulation in a finite 45°-rotated square lattice [2], we introduce an ansatz for quasiparticles in the tangent space of an IsoTNS[3,4], generalizing the ideas from 1D MPS [5] and PEPS[6]. We show that this ansatz can faithfully represent low-energy excitations with standing waves of spin flips, and discuss an algorithm to variationally optimize them.

As an intermediate step towards the optimization, we will also discuss an improved scheme for the compression of boundary MPS of isoTNS, dubbed bulk-weighted boundary compression. Such boundaries also appear in the DMRG² algorithm [7].

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(https://github.com/lukasjwittmann/iso_tns-public)

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