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Finite entanglement scaling at novel phase transitions in the Bose-Hubbard model with pairing terms MICHAEL ZALETEL, ROGER MONG, JOEL MOORE, University of California, Berkeley — With the introduction of pair hopping, the 1+1D Bose-Hubbard model contains string like defects and half vortices in addition to the familiar vortices that drive the Kosterlitz - Thouless (KT) transition. Recent work [1] proposed the existence of a novel phase transition directly from the insulating to superfluid phase which is partly of an Ising, rather than KT type, contrary to expectations based on symmetry. To characterize the transition we demonstrate an approach to the study of 1+1D critical phenomena using infinite matrix product state algorithms (iMPS), in which critical fluctuations are cut off not by a finite system size, but by the finite entanglement of the iMPS ansatz. Starting from the "finite entanglement" scaling of the correlation length [2], we show that scaling and correlation functions also admit a universal "finite entanglement" collapse, avoiding boundary effects and validating an elegant alternative to finite size scaling methods for critical phases.

[1] Shi, Lamacraft and Fendley, arxiv:1108.5744v1

[2] Pollmann, Mukerjee, Turner and Moore, Phys. Rev. Lett. 102, 255701 (2009)

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- [X] Prefer Oral Session
- [ ] Prefer Poster Session

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