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iPEPS studies of emergent supersymmetry at the pair density wave transitions of Dirac fermions in 2+1D YIFAN JIANG, JIQUAN PEI, SHAOKAI JIAN, HONG YAO, Tsinghua Univ — We study the quantum phase transition between the Dirac semimetal and pairing density wave (PDW) phase of the spinless honeycomb model with nearest neighbor attractions by doing fermionic projected entangled pairing state (PEPS) algorithm for infinite lattices. It was recently shown by renormalization group (RG) analysis that space-time supersymmetry (SUSY) emerges in Dirac fermions at their PDW transition¹. The connection of our present PEPS studies with the emergent space-time SUSY at the PDW transition shown by RG will be discussed.

¹Shao-Kai Jian, Yi-Fan Jiang, and Hong Yao, arXiv:1407.4497

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