

Abstract Submitted  
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**Loops, sign structures and emergent Fermi statistics in three-dimensional quantum dimer models**<sup>1</sup> YANG QI, Tsinghua University, VSEVOLOD IVANOV, California Institute of Technology, LIANG FU, Massachusetts Institute of Technology — We introduce and study three-dimensional quantum dimer models with positive resonance terms. We demonstrate that their ground state wavefunctions exhibit a nonlocal sign structure that can be exactly formulated in terms of loops, and as a direct consequence, monomer excitations obey Fermi statistics. The sign structure and Fermi statistics in these “signful” quantum dimer models can be naturally described by a novel parton construction, which becomes exact at the solvable point.

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