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Extended supersolid phase of frustrated hard-core bosons on a triangular lattice FA WANG, FRANK POLLMANN, ASHVIN VISHWANATH, UC Berkeley — We study a model of hard-core bosons with frustrated nearest-neighbor hopping (t) and repulsion (V) on the triangular lattice. We argue for a supersolid ground state in the large repulsion ($V \gg |t|$) limit where a dimer representation applies, by constructing a unitary mapping to the well understood unfrustrated hopping case. This generalized 'Marshall sign rule' allows us to establish the precise nature of the supersolid order by utilizing a recently proposed dimer variational wavefunction, whose correlations can be efficiently calculated using the Grassmann approach. By continuity, a supersolid is predicted over the wide parameter range, $V > -2t > 0$. This also establishes a simple phase diagram for the triangular lattice spin 1/2 XXZ antiferromagnet.

Fa Wang
UC Berkeley

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