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Exotic quantum phases in a frustrated quantum spin model on a honeycomb lattice[1] CHRISTOPHER VARNEY, University of Maryland / Georgetown University, KAI SUN, VICTOR GALITSKI, University of Maryland, MARCOS RIGOL, Georgetown University — A quantum spin liquid is a phase that defies the usual conventions, i.e. quantum fluctuations prevent long range order even at $T = 0$. The search for models that exhibit this type of behavior has intensified in recent years. In this work, we utilize the Lanczos algorithm to study hard-core bosons on a frustrated honeycomb lattice with nearest-neighbor (t) and next-nearest-neighbor hoppings (t'). The two limits of this model, $t'/t = 0$ and $t'/t = \infty$, favor two different superfluid phases. In between, we find that an anomalous phase is stabilized by the strong frustration in this system and compare its properties with a quantum spin liquid and a fragmented Bose-Einstein condensate.

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