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Quantum domain walls induce incommensurate supersolid phase on the anisotropic triangular lattice[1] SEBASTIAN EGGERT, Univ. of Kaiserslautern, XUE-FENG ZHANG, Max Planck Institute of complex systems, Dresden, SHI-JIE HU, AXEL PELSTER, Univ. of Kaiserslautern — We investigate the extended hard-core Bose-Hubbard model on the triangular lattice as a function of spatial anisotropy with respect to both hopping and nearest-neighbor interaction strength. At half-filling the system can be tuned from decoupled one-dimensional chains to a two-dimensional solid phase with alternating density order by adjusting the anisotropic coupling. At intermediate anisotropy, however, frustration effects dominate and an incommensurate supersolid phase emerges, which is characterized by incommensurate density order as well as an anisotropic superfluid density. We demonstrate that this intermediate phase results from the proliferation of topological defects in the form of quantum bosonic domain walls. Accordingly, the structure factor has peaks at wave vectors, which are linearly related to the number of domain walls in a finite system in agreement with extensive quantum Monte Carlo simulations. We discuss possible connections with the supersolid behavior in the high-temperature superconducting striped phase.

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