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Stripe glass and stripe supersolid of two-dimensional dipolar bosons in an optical lattice TOMMASO ROSCILDE, Ecole Normale Superieure de Lyon, France, MASSIMO BONINSEGNI, University of Alberta, Edmonton, Canada — Making use of mean-field theory and quantum Monte Carlo simulations, we investigate the zero-temperature phase diagram of dipolar bosons (with hard-core on-site interactions) on a square and triangular lattice. We consider dipoles forming an angle of 45 degrees with respect to the lattice plane, so that the dipolar interaction takes a spatially anisotropic nature, and it is attractive along the dipole direction and repulsive perpendicular to it. In the case of the square lattice, the attractive part of the interaction leads to the collapse of the dipolar gas and phase separation. On the contrary, in the case of the triangular lattice a stripe crystal is stabilized at most commensurate fillings of the form n/L, where $1 < n < L$ and L is the linear size. Yet, dislocations in the stripe crystal give rise to highly metastable states, which can be systematically studied at the mean-field level. Metastability is most pronounced close to half filling, and it leads to a strong tendency towards the formation of a "stripe glass," which exhibits a characteristic signature in the structure factor. For higher fillings crystal phase exhibits strong quantum fluctuations, and it hosts a superfluid fraction for sufficiently low strength of the dipolar potential, resulting in a stripe supersolid phase.

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