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Quantum Monte Carlo studies of charged monolayer Bose fluids EFSTRATIOS MANOUSAKIS, MARTECH, Physics Department, Florida State University and University of Athens, Greece, KEOLA WIERSCHEM, MARTECH, Physics Department, Florida State University — Computational studies of phase separation due to competing forces are implemented on monolayers of charged bosons above a smooth substrate (effectively a two dimensional Bose fluid). Hard-core bosons with van der Waals attraction are modeled with a Lennard-Jones potential, and to this is added a Coulomb repulsion of variable strength. The long range interparticle repulsion induces the Bose fluid to phase separate into ordered clumps of equilibrium liquid and low density gas, instead of a single domain of equilibrium liquid surrounded by its vapors. The "clumps" form bubbles or stripes (or a combination of these states), depending on the particle density as well as the repulsion strength. A Bose fluid with weak van der Waals attraction and large quantum fluctuations will become superfluid at low temperatures (as is the case with helium). The possibility of superfluidity in the microscopically phase separated state is also investigated. Path integral Monte Carlo is employed to include the effects of quantum fluctuations and particle permutations.

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