Two-dimensional dipolar Bose gas with tilted polarization

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We present results of diffusion Monte Carlo (DMC) simulations and of hyper-netted chain Euler-Lagrange (HNC-EL) calculations of a dipolar Bose gas in two dimensions, with the polarization axis tilted with respect to the plane. We study the behavior of this homogeneous, but anisotropic Bose gas at low densities, in particular the approach of the ground state energy to the universal limit, and the effect of the tilt angle on the condensate fraction. We find excellent agreement between the DMC and the HNC-EL low-density results. While the effect of anisotropy on the pair distribution function $g(x, y)$ is small for low densities, it becomes pronounced for high densities. Long-range fluctuation in g show that the range of structural order increases in the direction perpendicular to the plane of the tilt angle as the tilt angle approaches the critical angle where the system becomes unstable. We perform a stability analysis in the HNC/0 approximation.