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Variational studies of quantum liquid crystal phases of 2DEG EFSTRATIOS MANOUSAKIS, MARTECH, Physics Department, FSU, Tallahassee, FL and University of Athens, Greece, QUOC DOAN, MARTECH and Physics Department, FSU, Tallahassee, FL — The ground state of a nematic phase of the 2DEG at filling fraction$\nu = 1/2$is studied. The pair distribution function and interaction energy are calculated for a wavefunction having the Jastrow form for the correlation part of$\prod_{i<j} (z_i - z_j)^2$and an elliptical Fermi surface. First, the Fermi hypernetted chain (FHNC) approximation was employed in which, as usual, the contribution of the elementary diagrams is neglected. Our HNC/FHNC results agree very well with earlier reported results for various cases studied by the same approximation. Second we used the Monte Carlo (MC) method using periodic boundary conditions for a square geometry including the contribution of the image charges. To test our correct implementation of the second method, we computed for the same square geometry the pair distribution function and the energies of$\nu = 1, 1/3, 1/5$states and our results are in excellent agreement with earlier results in which the disk geometry was used. Our preliminary results indicate that there are important differences between FHNC and the MC. We find that in the FHNC calculation the nematic state is energetically favorable as compared to the isotropic state, while in the MC we find the contrary. Further work is necessary to study the role of the finite-size effects in MC, and more final results and conclusions will be presented at the meeting.

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