

Exchange and correlation in Wigner crystals

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We describe calculations for Wigner crystals in two and three dimensions. Within unrestricted Hartree-Fock (UHF) theory stable Wigner crystal solutions exist for $r_s > 1.44$ in two dimensions and $r_s > 4.5$ in three dimensions. Combining these results with diffusion quantum Monte Carlo (DMC) data shows that the correlation energies of the Wigner crystal phases are considerably smaller than those of the fluid phases at the same density. UHF theory tends to localise the electrons too strongly and DMC gives a somewhat more diffuse charge density and larger energy differences between different spin configurations.