**Lecture 16: Exchange energy for Jellium**

The Hartree-Fock equation is solved exactly for the jellium model. The self energy is calculated, giving a logarithmically divergent renormalization of the Fermi velocity, which is not seen experimentally. The exchange energy of jellium is computed, showing that it is self-bound. The exchange and correlation energy as a function of $r_s$ is discussed and the concept of the Wigner crystal is introduced for the large $r_s$ limit. The Hohenberg-Kohn density functional theory is introduced.

**Reading**: Marder 9.2.4, 9.3