PHYS 3317: Helium
Thursday October 16, 2014

Hand in at beginning of next lecture

A reasonable model of the electronic state of the ground state of Helium is

$$\psi(r_1, r_2, \sigma_1, \sigma_2) = \phi(r_1)\phi(r_2)\left(\uparrow_1\downarrow_2 - \uparrow_2\downarrow_1\right), \tag{1}$$

where

$$\phi(r) \sim e^{-|r|/2d}, \tag{2}$$

where d is a variational parameter.

Problem 1. There exist excited states of Helium where the electronic spins are polarized. Write down a reasonable variational wavefunction for such a state.

Solution 1.1.