

9/13/07

QUANTUM Theory of MANY-PARTICLE systems (540)

Numerical work (I suggest a target date of 10/2 but if there are difficulties (contact me by e-mail) it can be later)

(1) Write (jointly) a computer program that solves the differential equation for the radial wave function at negative energy for the effective potential an electron experiences in an atom. Use a smooth function to go from  $-Z/r$  at small  $r$  to  $-1/r$  at large  $r$ . Find the lowest eigenvalues of this potential consistent with the number of electrons that you are considering, *i.e.* you should find all the eigenvalues relevant for putting all the electrons in according to the Pauli principle. Read Secs.10.2.3 and 10.2.4 for a possible approach to this problem. Note that the present implementation leads to significant simplifications as compared to the equations that are solved in these sections.