

Phys 402: Applications of Quantum Mechanics

Homework IV (due 930am, Thursday, Feb 11, 2016)

[To receive full credits, please show all necessary steps that lead to your answers.]

1) Problem 6.16 (only a), c), d) and f)).

2) During our lectures, we have introduced the raising and lowering operators for angular momenta and spins. In Prob. 4.18 (page 166), you need to further find out their actions.

3) For $S=1/2$ electrons with $l=1$, find all the eigen states and eigen values for the spin-orbit Hamiltonian. Hint: there are six states which are degenerate when the spin-orbit coupling is absent. Find the Hamiltonian matrix of spin-orbit coupling for the 6-fold degenerate states. Apply the degenerate perturbation theory. Only very few matrix elements are nonzero.

4) Prob. 4.50 (spin correlations)