

Phys 402: Applications of Quantum Mechanics

Preparations: Raising and lowering operators of S and L (Chapter 4.3)

- 1) Prove the following operators will raise or lower S_z by one unit (up to a normalization factor). Compute the normalization factors.

- 2) Prove the following operators are raising and lowering operators of L_z .

3) Can you write down the Hamiltonian matrix for the SO coupling?

4) Can you find a way to construct the eigen states for the SO coupling?
What are the corresponding eigen values?
Hint: identify all the *good* quantum numbers.