

Quantum Chemistry Seminar 2

Angular momentum and spin

Exercise 1 (Anila)

Calculate $\hat{s}^2 = s_x^2 + s_y^2 + s_z^2$, where $\hat{s}_x = \begin{bmatrix} 0 & 1/2 \\ 1/2 & 0 \end{bmatrix}$, $\hat{s}_y = \begin{bmatrix} 0 & -i/2 \\ i/2 & 0 \end{bmatrix}$, $\hat{s}_z = \begin{bmatrix} 1/2 & 0 \\ 0 & -1/2 \end{bmatrix}$, and show that \hat{s}^2 commutes with any of the three matrices \hat{s}_x , \hat{s}_y , and \hat{s}_z .

Exercise 2 (unassigned)

Show the validity of commutation relations for \hat{s}_x , \hat{s}_y , and \hat{s}_z .