

Angular momentum 1

Recall that

$$L_1 = X_2 P_3 - X_3 P_2$$

$$L_2 = X_3 P_1 - X_1 P_3$$

$$L_3 = X_1 P_2 - X_2 P_1$$

Show that

$$X_1 L_3 - L_3 X_1 = -i\hbar X_2$$

$$X_2 L_3 - L_3 X_2 = i\hbar X_1$$

$$X_3 L_3 - L_3 X_3 = 0$$

and

$$P_1 L_3 - L_3 P_1 = -i\hbar P_2$$

$$P_2 L_3 - L_3 P_2 = i\hbar P_1$$

$$P_3 L_3 - L_3 P_3 = 0$$