

Angular momentum 1

Show that

$$X_1L_3 - L_3X_1 = -i\hbar X_2$$

$$X_2L_3 - L_3X_2 = i\hbar X_1$$

$$X_3L_3 - L_3X_3 = 0$$

and

$$P_1L_3 - L_3P_1 = -i\hbar P_2$$

$$P_2L_3 - L_3P_2 = i\hbar P_1$$

$$P_3L_3 - L_3P_3 = 0$$