TOTAL ANGULAR MOMENTUM OF ELECTRON

An electron possesses an orbital angular momentum $l\hbar$ and a spin angular momentum $s\hbar$. The total angular momentum is given by, $P_j = j\hbar$ which is the vector sum of $l\hbar$ and $s\hbar$. is called the total angular momentum quantum number.

For each value of the orbital quantum number l, there are two possibilities as given below —

$$j\hbar = l\hbar + s\hbar$$

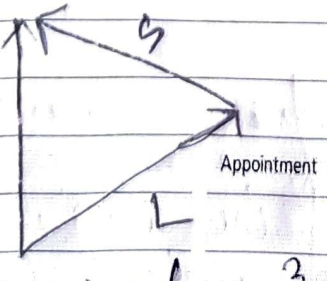
and $$j\hbar = l\hbar - s\hbar$$

$$\therefore j = l + s \text{ and } j = l - s.$$

The projection of the total angular momentum vector J_z in the direction of $\vec{B}$ is,

$$J_z = m_j \hbar$$

As j can have half integral values, m_j can also have half integral values. m_j can have $(2j+1)$ values from $+j$ to $-j$ excluding zero.



$$j = l + s = 1 + \frac{1}{2} = \frac{3}{2}$$

when $l = 1$ and $s = +\frac{1}{2}$

$$j = l - s = 1 - \frac{1}{2} = \frac{1}{2}$$

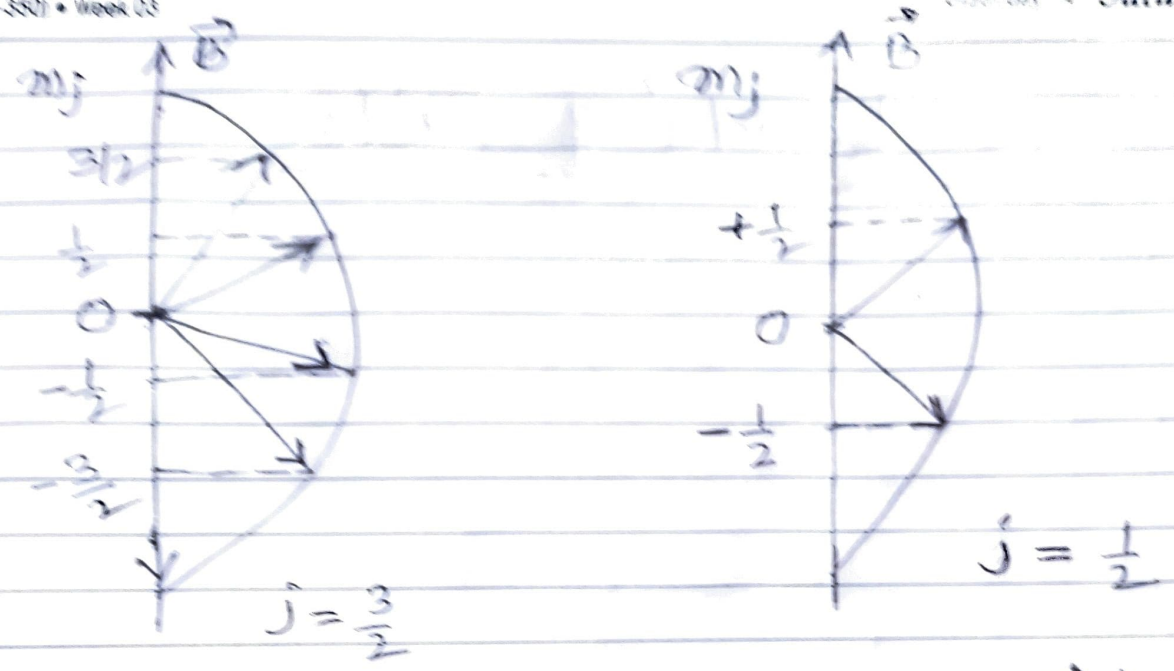
when $l = 1, s = -\frac{1}{2}$

(Two ways in which $\vec{L}$ and $\vec{S}$ can be added to form $\vec{J}$)

Notes

Appointment

Contacts



(Allowed projections of $\vec{J}$)

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