

(6.1) The quantum numbers $s = 1/2$ and $l = 2$ are assigned to a particle. (a) If spin and orbital movements are independent, how many space orientations (and thus measured spectral lines if no degeneration of energy states occur) are possible in an external field of such a strength that both movements are affected? (b) How many lines would be observed if spin and orbital movements are coupled?

(a) $s := \frac{1}{2}$ $l := 2$ $l = (-2, -1, 0, 1 \text{ and } 2)$ for each of $s = (-1/2 \text{ and } +1/2)$ gives 10 combinations

(b) Also 10.