

Answer on Question #43892, Physics, Atomic Physics

Task: what is magnitude of total orbital, total spin and total angular momenta for the ground state 4f of vanadium.

Solution:

$$\text{ground state } 4f \Rightarrow n = 4, l = 3, s = \frac{1}{2}, j = l - s = \frac{5}{2}.$$

$$P_l = \hbar \sqrt{l(l+1)} = 2\hbar\sqrt{3};$$

$$P_s = \hbar \sqrt{s(s+1)} = \hbar \frac{\sqrt{3}}{2};$$

$$P_j = \hbar \sqrt{j(j+1)} = \hbar \sqrt{\frac{35}{4}} = \frac{\hbar}{2} \sqrt{35}.$$

$$P_l = 2\hbar\sqrt{3} - \text{magnitude of total orbital momenta for the ground state } 4f;$$

$$P_s = \hbar \frac{\sqrt{3}}{2} - \text{magnitude of total spin momenta for the ground state } 4f;$$

$$P_j = \frac{\hbar}{2} \sqrt{35} - \text{magnitude of total angular momenta for the ground state } 4f.$$