

28/9
2012
12
Q:

ATOM

Övergångar (värdelängd)

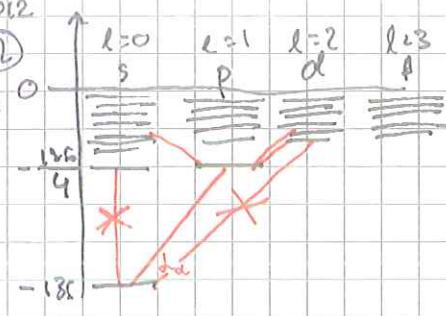
H _α	i H	7
H _γ	i H ⁺	3
H _β	i H	4
H _δ	i H	5
H _ε	i H	6
K _α	i Fe	1
K _β	i Mg	2

s=0 (spin-orbit). Fredags antimat.

$$E_{s=0} = \langle H' \rangle = \langle H_{s=0} \rangle = \langle \psi^0 | H_{s=0} | \psi^0 \rangle$$

$$H_{s=0} = -\vec{\mu}_s \cdot \vec{B}_{orb} \quad B_{orb} = -\frac{1}{c^2} \vec{v} \times \vec{E} = \left| \vec{E} = \frac{1}{c} \frac{\partial \vec{v}}{\partial t} \right|$$

Obs: $V \rightarrow$ pot. energi.
 $\Rightarrow \vec{V} = e \cdot \vec{V}$



Thomsonsprediction.

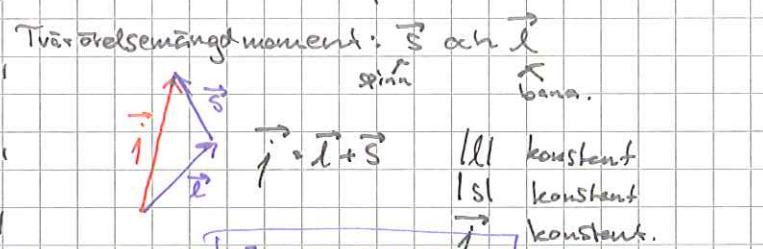
$$\Rightarrow H_{s=0} = \frac{1}{mc^2} \frac{1}{r} \frac{\partial V}{\partial t} \vec{s} \cdot \vec{l} \propto \text{konst} \frac{1}{r^3} \vec{l}$$

Not: $V = \frac{-e^2 / 4\pi\epsilon_0}{r}$

$$E_{K\alpha} = \frac{3}{4} 13.6 \text{ eV} (Z-1)^2$$

$$\frac{1}{\lambda} = R \left(\frac{1}{n_2^2} - \frac{1}{n_1^2} \right)$$

$$R_H = R_\infty \frac{M}{M+m}$$



Fermis gyllene regel

$$P_{12} \propto |eE|^2 |\langle 2 | \vec{r} \cdot \vec{e} | 1 \rangle|^2 =$$

$\neq 0$ ↑ D_{12} ↑ I_{ang} ↑ ger urvalsregler

URVALSREGLER...

Triangelregel: $||\vec{l}| - |\vec{s}|| \leq |\vec{j}| \leq |\vec{l}| + |\vec{s}|$

$|l-s| \leq j \leq l+s$ endast steg en 1.

$j = \frac{1}{2}; \frac{3}{2}$. i det fall då $l=1$ (p orb).

Δn godtyckligt.
 $\Delta l = \pm 1$ Atombas rörelsemängd ökar/minskar i enhetl.

Perilet \hat{p}

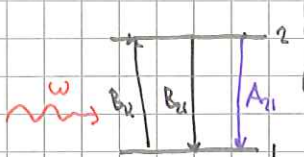
$\vec{p} \rightarrow -\vec{p}$ spegling i origo

$\hat{p} \psi_{lim} = (-1)^l \psi_{lim}$

Fotoner

$E = h \cdot f = \hbar \omega$ $L = \pm \hbar$

$p = \frac{E}{c} = \frac{h}{\lambda}$



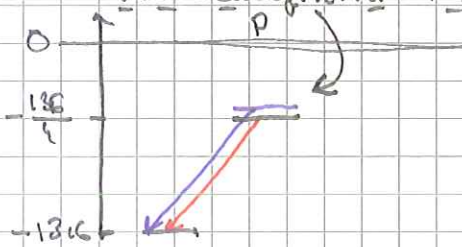
$$E_{fotoner} = |E_2 - E_1| = (13.6 - \frac{13.6}{4}) \text{ eV} = 10.2 \text{ eV}$$

$$E = hf = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{E} = \frac{6.628 \cdot 10^{-34} \cdot 3 \cdot 10^8}{10.2 \cdot 1.602 \cdot 10^{-19}} = 121.6 \text{ nm}$$

$\Rightarrow \lambda = 121.6 \text{ nm}$

Experimentellt $\lambda_{Ly\alpha} = \begin{cases} 121.56682 \text{ nm} \\ 121.56736 \text{ nm} \end{cases}$

\Rightarrow Delad energinivå \Rightarrow Två övergångar!



Det faktum att elektronen upplever ett magnetfält ger upphov till finstruktur.

magnetiskt moment.

$$\vec{\mu} = -g \cdot \mu_B \cdot \vec{S}$$

$|s \ m_s\rangle = \begin{cases} |\frac{1}{2} \ \frac{1}{2}\rangle = |\uparrow\rangle \\ |\frac{1}{2} \ -\frac{1}{2}\rangle = |\downarrow\rangle \\ s^2 |\uparrow\rangle = s(s+1) |\uparrow\rangle = \frac{3}{4} |\uparrow\rangle \\ s^2 |\downarrow\rangle = s(s+1) |\downarrow\rangle = \frac{3}{4} |\downarrow\rangle \end{cases}$