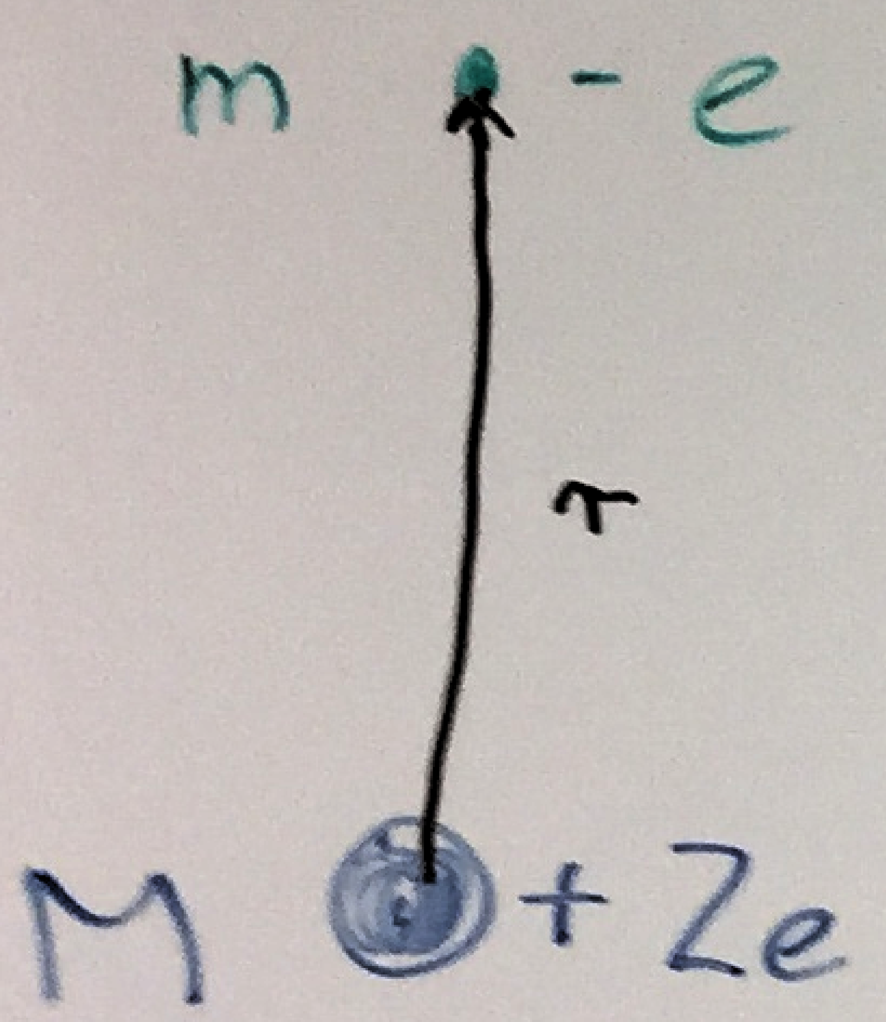


reduced mass

$$\mu = \frac{mM}{m+M}$$

$$\alpha_{EM} = \frac{e^2}{4\pi\varepsilon_0\hbar c} = \frac{1}{137.036\ldots}$$

$$R_y = \alpha_{EM}^2 \cdot \frac{m_e c^2}{2} = 13.606\ldots eV$$

Rydberg

$$a_0 = \frac{\hbar}{\alpha_{EM} m_e c} = 0.053\ldots nm$$

Bohr radius

$$E_{n,l,m} = -R_y \frac{Z^2}{n^2} \cdot \frac{\mu}{m_e}$$

$$a_0' = a_0 \cdot \frac{m_e}{\mu Z}$$

$$\varphi_{1,0,0,\pm\frac{1}{2}} = \sqrt{\frac{1}{\pi a_0'^3}}\, e^{-r/a_0'}$$

$n\ l\ m_l, m_s$

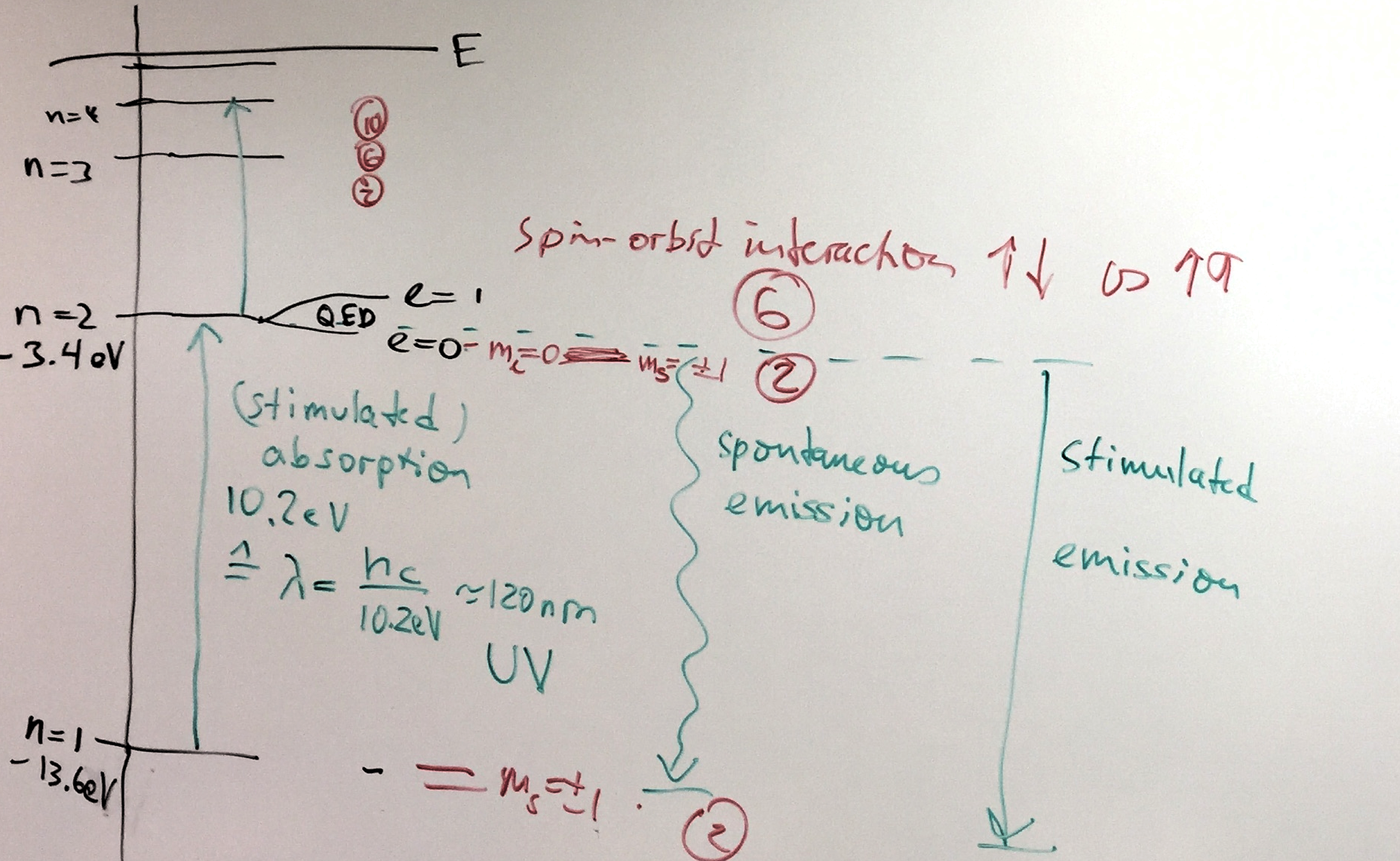
$n = 1, 2 \ldots$ $l = 0, 1 \ldots, n-1$ $m = 0, \pm 1, \pm 2 \ldots \pm l$

Q.M. → Q. Field Theory

Q.E.D. example ↑ =

interaction of photons + charges

Photon: $E = \hbar\omega$



$$\hbar\omega = -R_y Z^2 \cdot \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

only for 1-electron atoms

Spin S

vs. Orbital ang. mom. L

electron: $s = \frac{1}{2}$

$$\vec{S}^2 |\psi_{electron}\rangle = \hbar^2 \cdot \frac{3}{4} |\psi_{electron}\rangle$$

$$S_z |\psi_{electron}\rangle = \hbar m_s |\psi_{electron}\rangle$$

$$m_s = \pm \frac{1}{2}$$