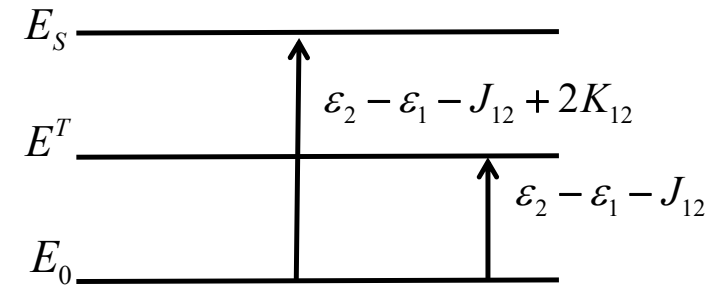


He atom: 1 denotes 1s, 2 denotes 2s

$$\left. \begin{aligned} E_0 &= 2h_{11} + J_{11} = 2\varepsilon_1 - J_{11} \\ E_T &= h_{11} + h_{22} + J_{12} - K_{12} \\ E_S &= h_{11} + h_{22} + J_{12} + K_{12} \end{aligned} \right| \begin{aligned} \varepsilon_1 &= h_{11} + J_{11} \\ \varepsilon_2 &= h_{22} + 2J_{12} - K_{12} \end{aligned}$$

$$E_T = \varepsilon_1 - J_{11} + \varepsilon_2 - 2J_{12} + K_{12} + J_{12} - K_{12} = \varepsilon_1 + \varepsilon_2 - J_{11} - J_{12}$$

$$E_S = \varepsilon_1 - J_{11} + \varepsilon_2 - 2J_{12} + K_{12} + J_{12} + K_{12} = \varepsilon_1 + \varepsilon_2 - J_{11} - J_{12} + 2K_{12}$$



$$\Delta E_T = E_T - E_0 = \varepsilon_2 - \varepsilon_1 - J_{12}$$

$$\Delta E_S = E_S - E_0 = \varepsilon_2 - \varepsilon_1 - J_{12} + 2K_{12}$$

$$E^+ = h_{11} = \varepsilon_1 - J_{11} \qquad E^- = 2h_{11} + h_{22} + J_{11} + 2J_{12} - K_{12}$$

$$IP = -h_{11} - J_{11} = -\varepsilon_1 \qquad EA = -h_{22} - 2J_{12} + K_{12} = -(\varepsilon_2 - 2J_{12} + K_{12}) + J_{11} - 2J_{12} + K_{12} = -\varepsilon_2$$