

Quiz 6

Monday, April 17, 2017 11:09 AM

Translating from bra-ket notation to an actual energy

Find the energy $\langle 1s | V_{\text{Hydrogen}}(\vec{r}) | 1s \rangle$ in units of eV.

- $|1s\rangle$ is a hydrogen orbital centered at origin
- $V_{\text{Hydrogen}}(\vec{r}) = \frac{-e^2}{4\pi\epsilon_0 r}$

Useful integral: $\int_0^{\infty} x e^{-x/x_0} dx = x_0^2$

Useful energy constant

$$\frac{e^2}{8\pi\epsilon_0 a} = 13.6 \text{ eV}$$

where a is Bohr radius