Домашняя работа № 4

№ 6.97 (б)

Дано:

$\psi(r) = A\exp\left(\frac{-r}{r_1}\right)$

$\langle F \rangle$ - ?

Решение:

$dP = \psi(r)^2 \cdot dV$

$P_{(r)} = A^2 \exp\left(2 \cdot \frac{-r}{r_1}\right) \cdot 4\pi r^2$

$$\langle F \rangle = \int_0^\infty F(r) P(r) dr \Rightarrow F(r) = k\frac{e^2}{r^2}$$

$$\Rightarrow \int_0^\infty k e^2 A^2 \exp\left(2 \cdot \frac{-r}{r_1}\right) 4\pi dr =$$

$$= 2\pi k e^2 A^2 r_1 = \frac{2k e^2}{r_1^2}$$

~~AC 6.100~~

№ 6.108 (б)

Дано:

$\psi = A\exp\left(-\frac{x^2}{a^2} + ikx\right)$

$\langle p_x \rangle - ?$

$\hat{p}_x = \frac{\hbar}{i}\frac{\partial}{\partial x}$

$$\langle p_x \rangle = \int_{-\infty}^{+\infty} \psi \cdot \frac{\hbar}{i}\frac{\partial \psi}{\partial x} dx = \ldots$$

$$= \sim = i\hbar \int_{-\infty}^{+\infty} \psi^* \psi dx = i\hbar$$