Z zad. 3.1.

ϕ od protonu

$$\phi(r) = \frac{1}{4\pi\varepsilon_0}\frac{e_0}{r}$$

$$\rho(r) = -\frac{e_0}{\pi a_0^3} e^{-\frac{2r}{a_0}}$$

$$W = \frac{1}{2}\int_0^\infty\int_0^\pi\int_0^{2\pi} \frac{-e_0}{\pi a_0^3} e^{-\frac{2r}{a_0}} \cdot \frac{1}{4\pi\varepsilon_0}\frac{e_0}{r} r^2 \sin\vartheta \, d\varphi \, d\vartheta \, dr =$$

$$= \frac{-e_0^2}{2\pi a_0^3\varepsilon_0}\int_0^\infty r e^{-\frac{2r}{a_0}} dr = \frac{-e_0^2}{8\pi\varepsilon_0 a} \approx -2{,}17\cdot 10^{-18} J \approx -13{,}6 eV$$

D I

$$-\left[r\frac{a_0}{2}e^{-\frac{2r}{a_0}} + \frac{a_0^2}{4}e^{-\frac{2r}{a_0}}\right]_0^\infty =$$

$+ \quad r \qquad e^{-\frac{2r}{a_0}}$

$- \quad 1 \qquad -\frac{a_0}{2}e^{-\frac{2r}{a_0}} \qquad = \frac{a_0^2}{4}$

$+ \quad 0 \qquad \frac{a_0^2}{4}e^{-\frac{2r}{a_0}}$

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