

Force Between a Proton and an Electron

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Newton's force:

$$F_{pe} = \frac{G_{pe} m_e m_p}{R_B^2} = 8.2 \times 10^{-8} N$$

Electric force:

$$F_{pe} = \frac{q_e^2}{4\pi\epsilon_0 R_B^2} = 8.2 \times 10^{-8} N$$

$$F_{pe} = g_{pe} m_e = 8.2 \times 10^{-8} N$$

Gravitational constant:

$$G_{pe} = \sqrt{G_e G_p}$$

$$G_e = \frac{q_e^2}{4\pi\epsilon_0 m_e^2} ; \quad G_p = \frac{q_p^2}{4\pi\epsilon_0 m_p^2}$$

Acceleration:

$$g_{pe} = \sqrt{g_e g_p}$$

$$g_e = \frac{kf_e^3}{c} = 1.15 \times 10^{18} ; \quad g_p = \frac{kf_p^3}{c} = 7.77 \times 10^{27}$$

$$g_{pe} = \frac{kf_{pe}^3}{c} ; \quad f_{pe} = \sqrt{f_e f_p}$$

R_B = Bohr's radius