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Physical constants

Werner Brefeld

Speed of light:

$$c = 2.99792458 \cdot 10^8 m/sec$$

Rest energy / rest mass:

$$E_0(electrons) = 0.51099906 MeV; \quad m_e = 9.1093897 \cdot 10^{-31} kg$$

$$E_0(protons) = 938.27231 MeV; \quad m_p = 1.6726231 \cdot 10^{-27} kg$$

$$1[kg] = 1[VAsec^3/m^2]$$

Classical electron radius:

$$r_e = 2.81794092 \cdot 10^{-15} m; \quad r_e = \frac{e^2}{4\pi \cdot \epsilon_0 \cdot E_0}$$

Electron charge magnitude:

$$e = 1.60217733 \cdot 10^{-19} Asec; \quad 1[eV] = 1.60217733 \cdot 10^{-19} [Wsec]$$

Permeability of free space:

$$\mu_0 = 4\pi \cdot 10^{-7} Vsec/Am$$

Permittivity of free space:

$$\epsilon_0 = 8.854187817 \cdot 10^{-12} Asec/Vm$$

$$\epsilon_0 \cdot \mu_0 \cdot c^2 = 1$$

Planck constant:

$$\hbar = 6.5821220 \cdot 10^{-22} MeVsec = 1.05457266 \cdot 10^{-34} Wsec^2$$

Fine structure constant:

$$\alpha = \frac{1}{137.0359895}; \quad \alpha = \frac{e^2}{4\pi \cdot \epsilon_0 \cdot \hbar \cdot c}$$

Gaussian curve:

$$f(x) = \frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{x^2}{2}}$$

$$f_{max}(x) = \frac{1}{\sqrt{2\pi}}$$

$$\int_{-0.5\cdot\sqrt{2\pi}}^{0.5\cdot\sqrt{2\pi}} f_{max} dx = 1$$

$$\sqrt{2\pi} = 2.506628$$

$$FWHM = 2\sqrt{2ln2} = 2.354820$$

$$\int_{-1}^{1} f(x)dx = 0.6827$$

$$\int_{-0.5\cdot FWHM}^{0.5\cdot FWHM} f(x)dx = 0.761$$

$$\int_{-2}^{2} f(x)dx = 0.9545$$

$$\int_{-3}^{3} f(x)dx = 0.9973$$