$v \ll 0.1c \qquad t' = t \qquad u = v_{S'} - v_S \qquad x' = x - ut \quad v'_x = v_x - u \quad a'_x = a_x$

$y' = y \qquad v'_y = v_y \qquad a'_y = a_y \qquad K.E = \frac{1}{2}mv^2 \qquad \rho = mv \qquad E = Fd$

$v \geqslant 0.1c \qquad \gamma = \frac{1}{\sqrt{1-(u/c)^2}} > 1 \qquad t' = \gamma(t - \frac{ux}{c^2}) \qquad x' = \gamma(x - ut)$

$v'_x = \frac{v_x - u}{1 - \frac{v_x u}{c^2}} \qquad y' = y \qquad v'_y = \frac{v_y\sqrt{1-(u/c)^2}}{1 - \frac{v_x u}{c^2}} \qquad \theta' = \tan^{-1}\frac{V'_y}{V'_x}$

$t_o = \gamma t_p \quad \text{rate} = \frac{1}{t} \quad L = \frac{L_p}{\gamma} \quad \theta = \tan^{-1}\frac{L_y}{L_x}$ | $\beta = \frac{v}{c} \quad \lambda_o = \lambda_s\sqrt{\frac{1 \pm \beta}{1 \mp \beta}} \quad f_o = f_s\sqrt{\frac{1 \mp \beta}{1 \pm \beta}}$

$m = m_0\gamma \qquad E_t = \gamma m_0 c^2 = m_0c^2 + K.E = \sqrt{\rho^2c^2 + E_0^2} \qquad E_0 = m_0c^2 \qquad K.E = (\gamma - 1)E_0$

$\rho = \gamma m_0 v = \frac{1}{c}\sqrt{E_t^2 - E_0^2} \qquad \rho^2c^2 = E_t^2 - E_0^2 \qquad F = \gamma^3 m_0 a \qquad v = \frac{pc^2}{E_t} = c\sqrt{1-(1/\gamma^2)}$

$c = \lambda f \qquad E = hf = \frac{hc}{\lambda} = W + K.E = W + eV \qquad W = hf_c = \frac{hc}{\lambda_c} \qquad K.E_{max} = \frac{1}{2}mv_{max}^2 = eV_S$

$\frac{n_e}{t} = \frac{I_p A}{hf} = \frac{P}{E} \qquad i = \frac{n}{t}\cdot e = \frac{Q}{t} \qquad I = \frac{P}{A} \qquad E_n = nhf$

$E_i > W, \qquad f_i > f_c, \qquad \lambda_i < \lambda_c$

$P = \sigma A T^4 \qquad \sigma = 5.6 \times 10^{-8} \qquad \lambda_{max}T = 2.898 \times 10^{-3}\text{mK} \qquad °K = 273 + °C$

$\lambda_{min} = \frac{hc}{eV} = \frac{1.26 \times 10^{-6}}{V}[\text{V}\cdot\text{m}] \qquad E = \rho c \qquad \lambda' = \lambda + \frac{h}{mc}(1 - \cos\theta) \qquad \lambda_c = \frac{h}{mc} = 2.426 \times 10^{-12}$

$K.E_e = E_{ph} - E'_{ph}$

$c = 3 \times 10^8\ \text{m/s} \qquad 1.6 \times 10^{-19}\ \text{J} = 1\ eV \qquad h = 6.626 \times 10^{-34}\ \text{J}\cdot\text{s}$

$e = 1.6 \times 10^{-19}\ \text{C} \qquad m_e = 9.11 \times 10^{-31}\ \text{kg} \qquad m_p = 1.67 \times 10^{-27}\ \text{kg}$

$\text{MeV}/c^2 = 1.79 \times 10^{-30}\ \text{kg} \qquad \text{MeV}/c = 5.36 \times 10^{-22}\ \text{kg}\cdot\text{m/s}$

$m_e c^2 = 0.511\ \text{MeV} \qquad m_p c^2 = 938\ \text{MeV} \qquad m_n c^2 = 939\ \text{MeV}$

$1\ \text{Å} = 10^{-10}\ \text{m} \qquad 1\ \text{L.Y} \approx 9.46 \times 10^{15}\ \text{m} \qquad 1\ \text{Ma} = 343\ \text{m/s}$