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

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

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

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

- -

$t_o = t_p\gamma \quad r = \frac{1}{t} \qquad \Delta t_S = 0 \to \Delta t_{S'} \neq 0, \quad \Delta t_{S'} = 0 \to \Delta t_S \neq 0$

$\gamma L_o = L_p \text{ //}, \quad L_o = L \perp$

$\beta = v/c \qquad \lambda_o = \lambda_s\sqrt{\frac{1 \pm \beta}{1 \mp \beta}} \qquad f_o = f_s\sqrt{\frac{1 \pm \beta}{1 \mp \beta}} \qquad \frac{v}{c} = \frac{\lambda_o^2 - \lambda_s^2}{\lambda_o^2 + \lambda_s^2} = \frac{f_s^2 - f_o^2}{f_s^2 + f_o^2}$

- -

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

$\rho = \gamma m_0 v \qquad \rho^2c^2 = E_t^2 - E_0^2 = E_t^2 - m_0^2c^4 \qquad \rho = \frac{1}{c}\sqrt{E_t^2 - E_0^2} \qquad F = \frac{\delta\rho}{\delta t} = \gamma^3 m_0 a$

$v = \frac{pc^2}{E_t} = c\sqrt{1-(1/\gamma^2)} \qquad \gamma = \frac{E_t}{E_o}$

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

$c = \lambda f \qquad E_{in} = E_{ph} = hf = \frac{hc}{\lambda} = W + K.E = W + eV \qquad W = hf_c = \frac{hc}{\lambda_c}$

$K.E = \frac{1}{2}mv^2 \qquad K.E_{max} = \frac{1}{2}mv_{max}^2 = eV_S \qquad v_{max} = \sqrt{\frac{2K.E_{max}}{m}} = \sqrt{\frac{2eV}{m}}$

$\frac{n}{t} = \frac{IA}{hf} = \frac{P}{E} \qquad i = \frac{n}{t} \cdot e = \frac{Q}{t} \qquad I = \frac{P}{A} \qquad \rho_{ph} = \frac{E_{ph}}{c} = \frac{h}{\lambda} \qquad E_n = nhf$

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

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

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

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

$m_ec^2 = 0.511 \text{ MeV} \qquad m_pc^2 = 938 \text{ MeV} \qquad m_nc^2 = 939 \text{ MeV}$

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