# Formulas for Course PHYS200

$c = 3.00 \times 10^8$ m/s
$e = 1.602 \times 10^{-19}$ C
$m_{\rm e} = 0.511$ MeV/c$^2$ $= 9.11 \times 10^{-31}$ kg
$m_{\rm p} = 938$ MeV/c$^2$ $= 1.67 \times 10^{-27}$ kg
1 eV $= 1.602 \times 10^{-19}$ J
1 pc $= 3.26$ ly

$$c = \lambda f \tag{1}$$

$$s = s_0 + v_0 t + \frac{1}{2} a t^2 \tag{2}$$

$$v = v_0 + at \tag{3}$$

$$v^2 = v_0^2 + 2as \tag{4}$$

$$\vec{F} = m\vec{a} \tag{5}$$

$$\vec{F} = \frac{d\vec{p}}{dt} \tag{6}$$

$$KE = \frac{1}{2} m v^2 \tag{7}$$

$$PE = mgh \tag{8}$$

$$x' = x - vt \tag{9}$$

$$u' = u - v \tag{10}$$

$$c = \frac{1}{\sqrt{\varepsilon_0 \mu_0}} \tag{11}$$

$$\gamma = \frac{1}{\sqrt{1-\beta^2}} \tag{12}$$

$$\beta = \frac{v}{c} \tag{13}$$

$$\Delta t_S = L_P \frac{v}{c^2} \tag{14}$$

$$(1-x)^n = 1 - nx + n(n-1)\frac{x^2}{2} + \cdots \tag{15}$$

$$\Delta t = \gamma \Delta t_0 \tag{16}$$

$$L = \frac{L_0}{\gamma} \tag{17}$$

$$v = HL \tag{18}$$

$$\left.\begin{matrix} x' \\ y' \\ z' \\ t' \end{matrix}\right\} = \begin{cases} \gamma(x - vt) \\ y \\ z \\ \gamma\left(t - \frac{vx}{c^2}\right) \end{cases} \tag{19}$$

$$\left.\begin{matrix} u'_x \\ u'_y \\ u'_z \end{matrix}\right\} = \begin{cases} \frac{u_x - v}{1 - u_x v/c^2} \\ \frac{u_y}{\gamma(1 - u_x v/c^2)} \\ \frac{u_z}{\gamma(1 - u_x v/c^2)} \end{cases} \tag{20}$$

$$v_{AB} = \frac{v_{AC} + v_{CB}}{1 + \frac{v_{AC} v_{CB}}{c^2}} \tag{21}$$

$$(\Delta s)^2 = (c\Delta t)^2 - (\Delta x)^2 \tag{22}$$

$$\vec{p} = \gamma m \vec{u} \tag{23}$$

$$E = \gamma m c^2 \tag{24}$$

$$K = (\gamma - 1) m c^2 \tag{25}$$

$$\vec{\beta} = \frac{\vec{p}c}{E} \tag{26}$$

$$E^2 = (pc)^2 + (mc^2)^2 \tag{27}$$

$$E_0 = mc^2 \tag{28}$$

$$E = pc \tag{29}$$

$$\frac{f}{f_0} = \sqrt{\frac{1 \pm \beta}{1 \mp \beta}} \tag{30}$$

$$\frac{f}{f_0} = \frac{1}{\gamma(1 \mp \beta \cos\theta)} \tag{31}$$

$$\vec{F} = q(\vec{E} + \vec{u} \times \vec{B}) \tag{32}$$

$$\Delta t_f = \Delta t_g \left(1 + \frac{gh}{c^2}\right) \tag{33}$$

$$f_g = f_f \left(1 + \frac{gh}{c^2}\right) \tag{34}$$

$$R = \frac{2GM}{c^2} \tag{35}$$

$$l = \frac{L}{4\pi d^2} \tag{36}$$