Equations

$$d\sin(\theta) = m\lambda \quad Double\ slit, \qquad 2d\sin(\theta) = m\lambda \quad Bragg$$

$$a\sin(\theta) = m\lambda \quad Single\ slit, \quad \theta_{res} = \frac{\lambda}{a}\ (slit), \quad \theta_{res} = 1.22\ \frac{\lambda}{D}\quad (hole)$$

$$d\sin(\theta) = m\lambda\ \ Diffraction\ grating, \quad Resolving\ Power,\ R = mN = \frac{\lambda}{\Delta\lambda}$$

$$\phi = 0, 2\pi, 4\pi, 6\pi... \quad Constructive\ Interference \quad \Delta x = 0,\ \lambda,\ 2\lambda,\ 3\lambda...$$

$$\phi = \pi, 3\pi, 5\pi... \quad Destructive\ Interference \quad \Delta x = \lambda/2,\ 3\lambda/2,\ 5\lambda/2...$$

$$\phi = K_n\Delta x, \quad K_n = \frac{2\pi}{\lambda/n}, \qquad \phi = \pi\ \ (if\ n_1 < n_2)\ \ \Delta x = \lambda/2$$

$$\gamma = 1/\sqrt{1-(v^2/c^2)}, \quad \beta = v/c, \quad \Delta t = \gamma\Delta t_0, \quad L_0 = \gamma L$$

$$E = KE + mc^2, \quad E^2 = p^2c^2 + m^2c^4, \quad E = \gamma mc^2, \quad \beta = pc/E$$

$$\lambda_{max}T = 0.2898 \times 10^{-2}\ m\ K, \quad E = \frac{hc}{\lambda}\ (photons!)$$

$$KE_{max} = E_{photon} - \Phi, \qquad KE_{max} = eV_{stop}, \qquad E_{threshold} = \Phi\ (Work\ Function)$$

$$\lambda_{scattered} - \lambda_{incident} = \frac{h}{m_e c}(1-\cos(\theta)), \qquad KE = \frac{p^2}{2m}$$

$$\Delta x\Delta p_x \geq \frac{h}{4\pi}, \qquad \Delta E\Delta t \geq \frac{h}{4\pi}, \qquad \lambda = \frac{h}{p}(DeBroglie)$$

$$(HYDROGEN): \qquad L = \frac{nh}{4\pi}(Bohr), \quad E_n = -\frac{Ke^2}{2a_o}\frac{1}{n^2}, \quad a_o = \frac{h^2}{(2\pi)^2 m_e Ke^2}$$

Constants

$h = 6.626 \times 10^{-34} J\ s$
$c = 2.9979 \times 10^{8}\ m/s$
$e = 1.6022 \times 10^{-19}\ C$
$m_e\ c^2 = 0.511 \times 10^{6}\ eV$

$hc = 1239.8\ eV\ nm$
$1\ eV = 1.6022 \times 10^{-19} J$
$M_{electron} = 9.11 \times 10^{-31}\ kg$