ΧΡΗΣΙΜΕΣ ΣΧΕΣΕΙΣ ΚΑΙ ΣΤΑΘΕΡΕΣ

$h = 6,6 \times 10^{-34}\ J \cdot s$, $c = 3 \times 10^{8}\ m/s$, $hc = 12400\ eV \cdot \AA$

$1\ \AA = 10^{-10}\ m$, $\hbar c = 1970\ eV \cdot \AA$, $1\ MeV = 10^{6}\ eV$, $1\ eV = 1,6 \times 10^{-19}\ J$

$m_{\pi^\pm} c^2 = 0,1396\ GeV$ (ισοδύναμη ενέργεια ηρεμίας) $h = 4,1 \times 10^{-15}\ eV \cdot s$

$m_p c^2 = m_{\bar{p}} c^2 = 0,9383\ GeV$

$$u(f,T) = \frac{8\pi h f^3}{c^3} \frac{1}{e^{hf/kT} - 1}, \quad K_{max} = hf - \varphi, \quad c_n = \int_{-\infty}^{+\infty} \psi \psi_n^* dx$$

$$\lambda' - \lambda_0 = \frac{h}{mc}(1 - \cos\theta), \quad E = nhf, \quad r_n = \frac{n^2 a_0}{Z}, \quad E = \hbar\omega$$

$$E_n = -\frac{13,6\, Z^2}{n^2} eV, \quad E^2 = p^2c^2 + m_0^2 c^4 = [\gamma m_0 c^2]^2, \quad \gamma = (1-\beta^2)^{-\frac{1}{2}}$$

$$\beta = v/c, \quad v_p = \omega/k, \quad v_g = d\omega/dk, \quad \lambda = h/p, \quad p = \gamma m_0 v$$

$$\Delta p_x \cdot \Delta x \geq \hbar, \quad \Delta E \cdot \Delta t \geq \hbar, \quad p = \hbar k, \quad \theta \sim \frac{\lambda}{D}, \quad k = \frac{2\pi}{\lambda}$$

$$-\frac{\hbar^2}{2m} \frac{\partial^2 \psi(x,t)}{\partial x^2} + U(x)\psi(x,t) = i\hbar \frac{\partial \psi(x,t)}{\partial t}, \quad \psi(x,t) = \sum_n c_n \psi_n(x,t)$$

$$\psi(x,t) = u(x) e^{-iEt/\hbar}, \quad -\frac{\hbar^2}{2m} \frac{d^2 u(x)}{dx^2} + U(x) u(x) = E u(x)$$

$$E_n = \frac{n^2 \pi^2 \hbar^2}{2mL^2}, \quad \psi_n(x,t) = \sqrt{\frac{2}{L}} \sin\left(\frac{n\pi x}{L}\right) e^{-i\frac{E_n}{\hbar}t}, \quad P_n = |c_n|^2$$

$$E_n = \left(n + \frac{1}{2}\right)\hbar\omega, \quad \langle A \rangle = \int \psi^* \hat{A} \psi\, dx, \quad \sum_n |c_n|^2 = 1$$

$$\Delta A = \sqrt{\langle A^2 \rangle - \langle A \rangle^2}, \quad \hat{H} = -\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2} + U(x), \quad \hat{x} = x$$

$$\hat{p} = -i\hbar \frac{\partial}{\partial x}, \quad T(E) \cong e^{-\frac{2}{\hbar}\int_{x'}^{x''} \sqrt{2m[U(x) - E]}\, dx}$$

$$\vec{J} = -\frac{i\hbar}{2m}\left\{\psi^* \nabla \psi - \psi \nabla \psi^*\right\}, \quad \psi(x,t) = A e^{ikx - i\frac{E}{\hbar}t}$$

$$|\vec{J}| = \frac{\hbar k}{m}|A|^2 = v|A|^2, \quad -\frac{\hbar^2}{2m}\nabla^2 \psi(\vec{r}) + U(\vec{r})\psi(\vec{r}) = E\psi(\vec{r})$$

$$\int_{-\infty}^{+\infty} x^2 e^{-\lambda x^2} dx = \frac{\sqrt{\pi}}{2\lambda^{3/2}}, \quad \int_{-\infty}^{+\infty} x^4 e^{-\lambda x^2} dx = \frac{3}{4}\frac{\sqrt{\pi}}{\lambda^{5/2}}, \quad \int_{-\infty}^{+\infty} x^6 e^{-\lambda x^2} dx = \frac{15}{8}\frac{\sqrt{\pi}}{\lambda^{7/2}}$$

$$\int_0^{\infty} x^n e^{-\lambda x} dx = \frac{n!}{\lambda^{n+1}}$$

$$\int_{-\infty}^{+\infty} e^{-\lambda x^2} dx = \sqrt{\frac{\pi}{\lambda}}, \qquad \mathrm{Re}\,\lambda > 0$$

$$\int_{-\infty}^{+\infty} x^2 e^{-\lambda x^2} dx = \frac{1}{2\lambda}\sqrt{\frac{\pi}{\lambda}}$$

$$\int_{-\infty}^{+\infty} x^4 e^{-\lambda x^2} dx = \frac{3}{4\lambda^2}\sqrt{\frac{\pi}{\lambda}}$$

$$\int_{-\infty}^{+\infty} x^{2n} e^{-\lambda x^2} dx = \frac{1\cdot 3\cdots(2n-1)}{(2\lambda)^n}\sqrt{\frac{\pi}{\lambda}} = \frac{(2n)!}{n!(4\lambda)^n}\sqrt{\frac{\pi}{\lambda}}$$

$$\int_{-\infty}^{+\infty} e^{-\lambda x^2+\mu x} dx = e^{\mu^2/4\lambda}\sqrt{\frac{\pi}{\lambda}}, \qquad \mathrm{Re}\,\lambda > 0$$

$$\int_0^{\infty} \frac{x^3}{e^x-1} dx = \frac{\pi^4}{15}$$

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$$\int \sin^2 kx\,dx = \frac{x}{2} - \frac{1}{4k}\sin 2kx$$

$$\int x \sin kx\,dx = \frac{\sin kx}{k^2} - \frac{x\cos kx}{k}$$

$$\int x \cos kx\,dx = \frac{x\sin kx}{k} + \frac{\cos kx}{k^2}$$

$$\int x^2 \sin^2 kx\,dx = \frac{x^3}{6} - \frac{x\cos 2kx}{4k^2} - \frac{(2k^2x^2-1)\sin 2kx}{8k^3}$$

$$\int x e^{-\lambda x} dx = -\left(\frac{x}{\lambda} + \frac{1}{\lambda^2}\right) e^{-\lambda x}$$

$$\int x^2 e^{-\lambda x} dx = -\left(\frac{x^2}{\lambda} + \frac{2x}{\lambda^2} + \frac{2}{\lambda^3}\right) e^{-\lambda x}$$

$$\int x^3 e^{-\lambda x} dx = -\left(\frac{x^3}{\lambda} + \frac{3x^2}{\lambda^2} + \frac{6x}{\lambda^3} + \frac{6}{\lambda^4}\right) e^{-\lambda x}$$

$$\int \frac{dx}{(x^2+a^2)^2} = \frac{x}{2a^2(x^2+a^2)} + \frac{1}{2a^3}\tan^{-1}(x/a)$$