ELEKTRIKA:

$$I = \frac{de}{dt}$$

$$\int I \cdot dt = \Delta e$$

$$F = \frac{e_1 e_2}{4\pi\varepsilon_0 r^2} = e_0 \vec{E}$$

$$U = \vec{E} \cdot \vec{s} = \frac{A_e}{e}$$

$$\sigma_e = \frac{e}{S}$$

$$E = \frac{\sigma}{2\varepsilon_0}$$

$$\oint D dS = e$$

$$e = CU,,, e_p = CU_p$$

$$C = \frac{\varepsilon_0 S}{l} = \frac{2\pi\varepsilon l}{\ln r_2 / r_1}$$

$$W_e = \frac{CU^2}{2} = \frac{e^2}{2C}$$

$$W_p = qV$$

$$\Delta W_p + \Delta W_{kin} = 0$$

$$w_e = \frac{W_e}{V} = \frac{\varepsilon_0 E^2}{2}$$

$$U = RI$$

$$P = UI = RI^2 = \frac{U^2}{R}$$

$$R = \frac{\xi \cdot l}{S_0}$$

$$A = Fs = \int M d\varphi = \int P dt = \Delta$$

Praznjenje kondenzatorja:

$$U_c = U_0 \cdot e^{-\frac{t}{RC}}$$

$$I_c = I_0 \cdot e^{-\frac{t}{RC}}$$

Polnjenje kondenzatorja:

$$U_c = U_g (1 - e^{-\frac{t}{RC}})$$

$$I_c = \frac{U_g}{R} e^{-\frac{t}{RC}}$$

Admitanca kondenzatorja:

$$Z_C = \frac{1}{\omega C}$$

RLC vezje:

$$U_0 = I \cdot \sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

Krožna zanka:

$$V = \frac{e}{4\pi\varepsilon_0 \sqrt{r^2 + z^2}}$$

$$E = \frac{e \cdot z}{4\pi\varepsilon_0 (r^2 + z^2)^{3/2}}$$

MAGNETIZEM:

$$F = IBl \cdot \sin\alpha$$

$$\vec{F} = e \cdot \vec{v} \times \vec{B}$$

$$B = \mu_0 H = \frac{\mu_0 I}{2\pi r} = \frac{\mu_0 NI}{l}$$

$$M = NISB \sin\alpha = J\alpha$$

$$U_i = \frac{d\Phi_m}{dt} = -BS\omega \cdot \sin(\omega t) =$$

$$\Phi_m = \int B dS = BS \cdot \cos(\omega t) = [V$$

$$d\Phi_m = SdB$$

$$L = \frac{\mu_0 N^2 S}{l} = \frac{\Phi}{I}$$

$$W_m = \frac{LI^2}{2} = p_m B \cos\varphi$$

$$p_m = NIS$$

$$w_m = \frac{B^2}{2\mu_0} = \frac{HB}{2}$$

Nihajni čas mag. igle ali tuljave

p_m – mag. moment

$$t_0 = 2\pi\sqrt{\frac{J}{p_m B}}$$

Zakon o mag. pretoku:

$$\oint \vec{B} d\vec{S} = 0$$

Zakon o mag. napetosti (Amperov zakon):

$$\oint \vec{H} \cdot d\vec{s} = I$$

H okoli vodnika in dolge tuljave:

$$H = \frac{I}{2\pi r} = \frac{NI}{l}$$

Pojemanje toka in napetosti skozi tuljavo:

$$\tau = L/R$$

$$I(t) = I_0 \cdot e^{-t/\tau}$$

$$U_R = -I_0 \cdot R \cdot e^{-t/\tau}$$

$$U_L = I_0 \cdot R \cdot e^{-t/\tau}$$

Naraščanje toka in napetosti skozi tuljavo:

$$I(t) = \frac{U_0}{R}(1 - e^{-t/\tau})$$

$$U_R = -U_0 (1 - e^{-t/\tau})$$

$$U_L = -U_0 \cdot e^{-t/\tau}$$

Impedanca tuljave:

$$Z_L = \omega L$$

SEVANJE:

a – albeda ali odbojnost

j – gostota energ. Toka.

$$P_{ABS} = (1-a)\, jS$$

$$P_{IZS} = (1-a)\sigma T^4 S$$

C – toplotna kapaciteta [J/K]

$$-dQ = j^* S dt$$

$$-CdT = \sigma T^4 S dt$$

FOTOMETRIJA:

Svetlobni tok:

$$P = \frac{dW}{dt} = [W]$$

Gostota svetlobnega toka:

$$j = \frac{dP}{dS} = \frac{P}{4\pi r^2} = \left[\frac{W}{m^2}\right]$$

Svetilnost:

$$I = \frac{dP}{d\Omega} = \left[\frac{W}{sr}\right]$$

$$I = r^2 \cdot j = BS_0 \cos\varphi$$

$$dI = B \cdot dS \cdot \cos\vartheta$$

Svetlost:

$$B = \frac{dI}{dS_0^{'}} = \left[\frac{W}{sr \cdot m^2}\right]$$

Osvetljenost:

$$E = \frac{dP}{dS} = \left[\frac{W}{m^2}\right]$$

$$E = j \cdot \cos\varphi$$

$$dE = \frac{dI \cdot \cos\vartheta}{r^2}$$

GEOMETRIJSKA OPTIKA:

Odboj in lom svetlobe:

Lomni količnik:

$$n = c_0 / c$$

Lomni zakon:

$$n_1 \sin\alpha = n_2 \sin\beta$$

Totalni odboj:

$$\sin\beta_t = \frac{n_1}{n_2}$$

Gorišče:

f – goriščna razdalja

a – razdalja predmeta od zrcala

b – razdalja slike od zrcala

d - dioptrija

$$\frac{1}{f} = \frac{1}{a} + \frac{1}{b}$$

$$d = a + b = a_1 + a_2 = b_1 + b_2$$

Gor. razdalja zbiral. krogelnega zrcala:

r – radij krogle ali krivinski polmer

$$f = \frac{r}{2}$$

Povečava:

$$N = b / a$$

Bikonveksna leča:

$$\frac{1}{f_1}=\left(\frac{n}{n_1}-1\right)\frac{2}{r}$$

Sestavi ne razmaknjenih leč:

$$\frac{1}{f}=\frac{1}{f_1}+\frac{1}{f_2}$$

Povečava lupe:

α – kot pod katerim vidimo predmet z lupo

α_0 – kot pod katerim vidimo predmet z prostim očesom

$$N=\frac{\tan\alpha}{\tan\alpha_0}=\frac{a_0}{f}$$

Povečava mikroskopa:

f – gorišče objektiva

f' – gorišče okularja

x' – razdalja med goriščema (tubus)

a_0 – normalna zorna razdalja

$$N=\frac{\tan\alpha}{\tan\alpha_0}=\frac{a_0\cdot x'}{f\cdot f'}$$

$$\tan\alpha_0=\frac{y}{a_0}$$

$$\frac{y'}{y}=\frac{b}{a},,,\tan\alpha=\frac{y'}{f_2}$$

Daljnogled:

$$N=\frac{\tan\alpha}{\tan\alpha_0}=\frac{f}{f'}$$

POSEBNA TEORIJA RELATIVNOSTI

Transofmacija za hitrosti:

$$v'_x=\frac{v_x-v_0}{\left(1-\frac{v_0v_x}{c_0^2}\right)}$$

$$v'_y=\frac{v_y}{\gamma_0\left(1-\frac{v_0v_x}{c_0^2}\right)}$$

$$v'_z=\frac{v_z}{\gamma_0\left(1-\frac{v_0v_x}{c_0^2}\right)}$$

Obratna transformacija:

$$v_x=\frac{v'_x+v_0}{\left(1+\frac{v_0v'_x}{c_0^2}\right)}$$

$$v_y=\frac{v'_y}{\gamma_0\left(1+\frac{v_0v'_x}{c_0^2}\right)}$$

$$v_z=\frac{v'_z}{\gamma_0\left(1+\frac{v_0v'_x}{c_0^2}\right)}$$

Skrčenje dolžin:

Palica miruje v sistemu S:

$$x_2-x_1=L$$

Dogodek 1:

$$t_1=0\qquad x_1=0$$

Dogodek 2:

$$t_2=\frac{v_0L}{c_0^2}\quad x_2=L$$

Lorentzova transformacija

Sistem S':

Dogodek 1:

$$t'_1=0\qquad x'_1=0$$

Dogodek 2:

$$t'_2=0\quad x'_2=\frac{L}{\gamma_0}$$

$$x'_2-x'_1=\frac{L}{\gamma_0}=L'$$

Podaljšanje časa

1. dogodek: mesto x, čas t_1

2. dogodek: mesto x, čas t_2

$$\Delta t=t_2-t_1$$

Lorentzova transformacija:

$$t'_1=\gamma_0\left(t_1-\frac{v_0x}{c_0^2}\right)$$

$$t'_2=\gamma_0\left(t_2-\frac{v_0x}{c_0^2}\right)$$

$$t'=t'_2-t'_1=\gamma_0(t_2-t_1)=\gamma\tau$$

$$\Delta t'=\gamma_0\Delta t$$

$$t_1=\gamma(t'_1+\frac{v\cdot x'_1}{c^2}$$

$$t_2=\gamma(t'_2+\frac{v\cdot x'_2}{c^2}$$

$$x'_1=\gamma(x_1-vt_1)$$

$$x'_2=\gamma(x_2-vt_2)$$

$\Delta t'\geq\Delta t$ => za gibajočega opazovalca dogodki potekajo počasneje kot za opazovalca, ki miruje ob dogodkih.

ZAKONI GIBANJA

Gibanje delca

dt – čas, ki ga izmeri opazovalec, ki opazuje gibanje točkastega telesa

dτ – lastni čas, ki ga izmeri opazovalec, ki se giblje skupaj z delcem

$$dt=\gamma d\tau$$

$$\gamma=\frac{1}{\sqrt{1-\frac{v^2}{c_0^2}}},,,\gamma^2=\frac{v^2\gamma^2}{c^2}+1$$

$$v=\sqrt{1-\frac{1}{\gamma^2}}\cdot c$$

GIBALNA KOLIČINA

E – polna energija

m_0 ali mc^2 – mirovna masa

p – gibalna količina

$$E=mc^2=\left[\frac{eV}{c^2}\right]$$

$$E=W_k+m_0c^2$$

$$E=\sqrt{p^2c^2+m_0^2c^4}$$

$$W_k=mc^2(\gamma-1)=[eV]$$

$$p=\gamma mv=e_0Et=\left[\frac{eV}{c}\right]$$

$$p=\sqrt{\frac{W_k^2+2W_kmc^2}{c^2}}$$

De Broglijeva val dolžina:

Fotoni:

$$P=t\cdot k=\frac{h}{\lambda}$$

$$W=t\cdot\omega$$

$$t=\frac{h}{2\pi}$$

$$k=\frac{2\pi}{\lambda}$$

Elektroni:

$$\lambda_B=\frac{h}{P}=\frac{h}{m\cdot v}$$