Лекция 6.

Теория возмущений

$$\sin\theta = \frac{p_y}{p}$$

$$p_y = \int_{-\infty}^{\infty} F_y dt = \int_{-\infty}^{\infty} \frac{y(t)}{r(t)} F(r(t)) dt$$

$$y \approx b, \quad x \approx v_0 t, \quad r \approx \sqrt{b^2 + {v_0}^2 t^2}$$

$$\frac{p_y}{p} \approx \frac{1}{p} \int_{-\infty}^{\infty} \frac{bF(\sqrt{b^2 + (v_0 t)^2})}{\sqrt{b^2 + (v_0 t)^2}} dt$$

$$u = {v_0 t}/{b} \qquad p = m v_0, \quad E = {m v_0^2}/{2}$$

$$Sin\theta \approx \theta \approx \frac{b}{2E} \int_{-\infty}^{\infty} \frac{F(b\sqrt{1+u^2})}{\sqrt{1+u^2}} du$$

$$F = \frac{Z_1 Z_2 e^2}{r^2} = \frac{Z_1 Z_2 e^2}{b^2(1+u^2)}$$

$$\theta \approx \frac{b}{2E}\frac{Z_1 Z_2 e^2}{b^2} 2\int_0^\infty \frac{1}{\left(1+u^2\right)^{3/2}} du = \frac{Z_1 Z_2 e^2}{Eb}$$

$$\frac{dq}{d\theta} = q(\theta) = 2\pi b\left|\frac{db}{d\theta}\right| = \frac{2\pi (Z_1 Z_2 e^2)^2}{E^2\theta^3}$$

$$\theta_{\min} = \frac{Z_1 Z_2 e^2}{E r_{sc}}$$

$$1-\cos\theta=\frac{1}{2}\theta^2 \qquad \theta\approx\frac{Z_1Z_2e^2}{Eb}$$

$$\Sigma_{tr}^{(1)}=\int(1-\cos\theta)dq=\int_0^{\pi}q(\theta)(1-\cos\theta)d\theta$$

$$\Sigma_{tr}=\frac{4\pi Z_1^2Z_2^2e^4}{m^2v_0^{\ 4}}\int\frac{db}{b}$$

$$\Lambda=\ln\frac{b_{\max}}{b_{\min}}$$

$$b_{\max}\sim\left(\frac{T}{4\pi ne^2}\right)^{1/2}$$

$$b_{\min}\sim\frac{Z_1Z_2e^2}{mv_0^{\ 2}}$$

$$\frac{b_{\max}}{b_{\min}}=\frac{3T^{3/2}}{2\pi^{1/2}e^3n^{1/2}}\sim N_d>>1$$