$$Z_{эф} = \frac{AU}{1.9\cdot 10^{-28} P_p} \qquad A = 0.113\ \frac{Вт}{В} \qquad U - \text{сигнал В}$$

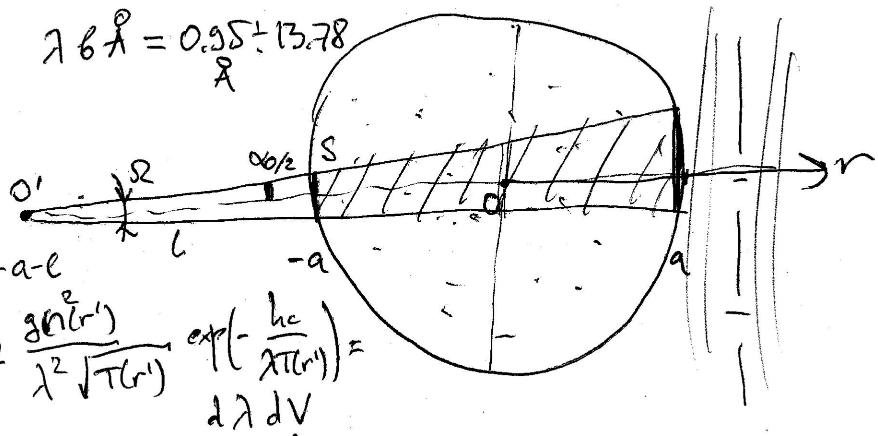
$$P_p \text{ в } \frac{Вт}{см^3\,Å\,стер}$$

$$dV = S(r')dr' = \pi r'^2 tg^2\frac{\alpha_0}{2} dr'$$

$hc = 12395$ эВ·Å $\quad T = kT$ в эВ $\quad \lambda$ в Å $= 0.95 \div 13.78$ Å

$\Omega = 1.854\cdot 10^{-3}$ стер

$tg\frac{\alpha_0}{2} = 2.437\cdot 10^{-2}$



$$P_p = \int_V\int_\lambda \Omega f(V,\lambda)\, dV d\lambda = \iint_{V\lambda} \Omega \frac{g n^2(r')}{\lambda^2\sqrt{T(r')}} \exp\left(-\frac{hc}{\lambda T(r')}\right) d\lambda dV =$$

$$= g\Omega\pi tg^2\frac{\alpha_0}{2} \int_{\lambda_1}^{\lambda_2}\int_{r_1=l}^{r_2=l+2a} \frac{n^2(r')}{\lambda^2\sqrt{T(r')}} r'^2 \exp\left(-\frac{hc}{\lambda T(r')}\right) d\lambda dr' = \qquad r = r' - l - a$$

$$= g\Omega\pi tg^2\frac{\alpha_0}{2} \int_{-a}^{a} \frac{n^2(r)}{\cancel{\lambda^2}\sqrt{T(r)}} \Lambda(r)(r+l+a)^2 dr$$

$$t = \frac{1}{\lambda} \quad dt = -\frac{1}{\lambda^2} d\lambda$$

$$\Lambda(r) = \int_{\lambda_1}^{\lambda_2} \frac{1}{\lambda^2} \exp\left(-\frac{hc}{\lambda T(r)}\right) d\lambda = \int_{1/\lambda_2}^{1/\lambda_1} \exp\left(-\frac{hc}{T(r)} t\right) dt = \frac{T(r)}{hc} \exp\left(-\frac{hc}{T(r)\lambda}\right)\Bigg|_{\lambda_1}^{\lambda_2}$$

$$P_p = \pi tg^2\frac{\alpha_0}{2} \frac{g\Omega}{hc} \int_{-a}^{a} \frac{n^2(r)(r+l+a)^2}{\cancel{\lambda^2\sqrt{T(r)}}} \sqrt{T(r)} \left(\exp\left(-\frac{hc}{\lambda_2 T(r)}\right) - \exp\left(-\frac{hc}{\lambda_1 T(r)}\right)\right) dr$$

$l = 19$ cm
$a = 25$ cm

Если $T, n = const$ $\qquad g = 1$

$$P_p = \pi tg^2\frac{\alpha_0}{2} \frac{g\Omega}{hc} \langle n\rangle^2 \sqrt{\langle T\rangle} \left(\exp\left(-\frac{hc}{\langle T\rangle\lambda_2}\right) - \exp\left(-\frac{hc}{\langle T\rangle\lambda_1}\right)\right) \frac{(l+2a)^3 - l^3}{3}$$

$$P_p = 2.79\cdot 10^{-10} \langle n\rangle^2 \sqrt{\langle T\rangle} \left(\exp\left(-\frac{12395}{\langle T\rangle\, 13.78}\right) - \exp\left(-\frac{12395}{\langle T\rangle\, 0.95}\right)\right) \cdot 107216{,}7 =$$

$$= 3\cdot 10^{-5} \langle n\rangle^2 \sqrt{\langle T\rangle} \left(\exp\left(-\frac{900}{\langle T\rangle}\right) - \exp\left(-\frac{13047}{\langle T\rangle}\right)\right)$$

$$Z_{эф} \approx \frac{0.113\, U}{1.9\cdot 10^{-28}\cdot 3\cdot 10^{-5}} = 2\cdot 10^{31} \frac{U}{\langle n\rangle^2\sqrt{\langle T\rangle}\left(\exp\left(-\frac{900}{\langle T\rangle}\right) - \exp\left(-\frac{13047}{\langle T\rangle}\right)\right)}$$

$$T = T(r) = \left(T(0) - T(a)\right)\left(1 - \left(\frac{r}{a}\right)^2\right)^2 + T(a)$$

$$n = n(r) = \left(n(0) - n(a)\right)\left(1 - \left(\frac{r}{a}\right)^2\right)^2 + n(a)$$

$$P_p = C \int_{-a}^{a} \frac{n^2(r)\,(r+l+a)^2}{\cancel{\ }\sqrt{T(r)}}\, T(r) \left(\exp\left(-\frac{hc}{\lambda_2 T(r)}\right) - \exp\left(-\frac{hc}{\lambda_1 T(r)}\right) \right) dr =$$

$$C = \pi \, tg^2 \frac{\alpha_0}{2} \, \frac{g\Omega}{hc}$$

$$= C \int_{-a}^{a} n^2(r)\,(r+l+a)^2 \sqrt{T(r)} \left(\exp\left(-\frac{hc}{\lambda_2 T(r)}\right) - \exp\left(-\frac{hc}{\lambda_1 T(r)}\right) \right) dr =$$

$$= C \int_{-a}^{a} \left(n(a) + (n(0)-n(a))\left(1-\left(\frac{r}{a}\right)^2\right)^2 \right)^2 (r+l+a)^2 \sqrt{T(a) + \left(T(0)-T(a)\right)\left(1-\left(\frac{r}{a}\right)^2\right)^2} \cdot$$

$$\cdot \exp\left(-\frac{hc}{\lambda_2 \left[T(a) + \left(T(0)-T(a)\right)\left(1-\left(\frac{r}{a}\right)^2\right)^2\right]}\right) - \exp\left(-\frac{hc}{\lambda_1 \left[T(0) + \left(T(0)-T(a)\right) \cdot \left(1-\left(\frac{r}{a}\right)^2\right)^2\right]}\right) dr$$

$$\approx \pi \, tg^2 \frac{\alpha_0}{2} \, \frac{g\Omega}{hc} \sum_{\substack{r=-a \\ noi}}^{a} \left(n(a) + (n(0)-n(a))\left(1-\left(\frac{r_i}{a}\right)^2\right)^2 \right) (r_i+l+a)^2 \cdot$$

$$\cdot \sqrt{T(a) + \left(T(0)-T(a)\right)\left(1-\left(\frac{r_i}{a}\right)^2\right)^2} \cdot \exp\left(-\frac{hc}{\lambda_2 \left[T(a) + \left(T(0)-T(a)\right)\left(1-\left(\frac{r_i}{a}\right)^2\right)^2\right]}\right) -$$

$$- \exp\left(-\frac{hc}{\lambda_1 \left[T(a) + \left(T(0)-T(a)\right)\left(1-\left(\frac{r_i}{a}\right)^2\right)^2\right]}\right) \cdot \underbrace{(r_i - r_{i-1})}_{\Delta r}$$

$\rightarrow$ гиса.