



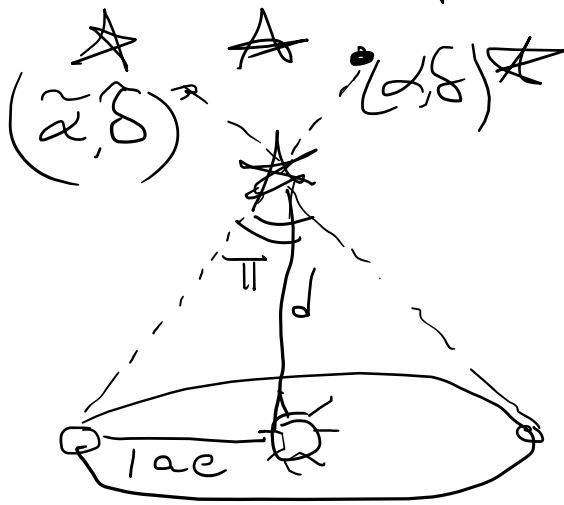
Модуль. Астрофизика.

Семинар 1. (30.10)

Continue. $M_{\odot} = 2 \cdot 10^{33} \text{ g}$

$L_{\odot} = 4 \cdot 10^{33} \text{ erg/s}$

$10^7 \text{ erg} = 10 \text{ mm}$



$d = l_{ae} / \tan \pi$
 $\pi \ll 1 \quad \tan \pi \approx \pi$
 $d = \frac{l_{ae}}{\pi}$

~~$c = \frac{r_1 r_2}{r^2} = 1$~~

~~$\frac{r_1 r_2}{r^2}$~~

$\pi < 1''$

$\beta = 60'$

$\beta' = 60''$

$l_{ae} = 206265''$

$l_{ur} : \pi = 1''$

$l_{ur} = 206265 \cdot a_e$

$a_e = 150 \text{ man. } \mu\text{m}$

$l_{ur} \approx 3.1 \cdot 10^{18} \text{ cm}$

m - lugurman gl. len.

$$M_0 = -26,7^m$$

M - adc. gl. len. $\rightarrow d = 10 \mu\text{K}$

$$M_0 = +4,8^m$$

$$M_{\text{lim}} = 6^m$$

$$m - M = 5 \lg \frac{r}{\mu\text{K}} - 5 + A(\lambda)$$

$$\Delta m = 1$$

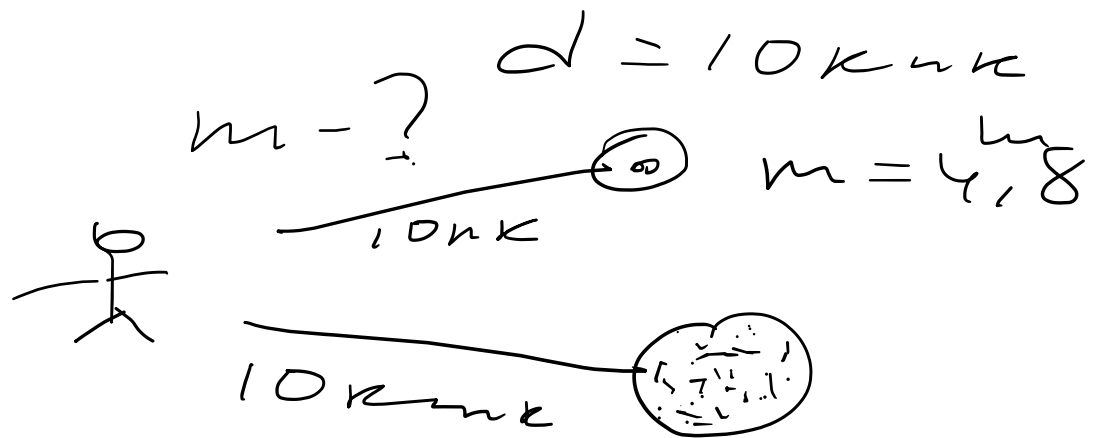
$$\frac{f_1}{f_2} = 2,5^{12}$$

$$\Delta m = 5$$

$$= 100$$

↑
menyfl. μK . data

① Crown. $N = 10^5$ $L = L_0$



$$\frac{f_{\star}}{f_{\text{crown}}} = 10$$

1. $\text{upward } \rho \sim 10^5 \text{ г/см}^3$
2. $\text{downward } \rho \sim 10^6 \text{ г/см}^3$

$$f = \frac{L}{4\pi d^2} \sim d^{-2}$$
$$-2,5 \lg \frac{d_1}{d_2} \rightarrow +2,5$$

$$m_{\text{crown}} = 4,8 + 2,5 = 7,3$$

② Как о́на вы́дет пересчет (D-?)
 ???? глубе́та \odot c кни́ка

$$M_0 = 4,8$$

$$\frac{dz}{d_1} = 100$$

$$\frac{f_2}{f_1} = \left(\frac{d_1}{d_2} \right)^2 = 10^{-4}$$

$$\Delta m = 5 \rightarrow \frac{f_4}{f_3} = 100$$

$$0,8 \text{ cm} : \left. \begin{array}{l} 6 \text{ m} \\ 14,8 \text{ m} \end{array} \right\} \Delta m = 8,8$$

$$\Delta m = 10$$

$$m = 14,8$$

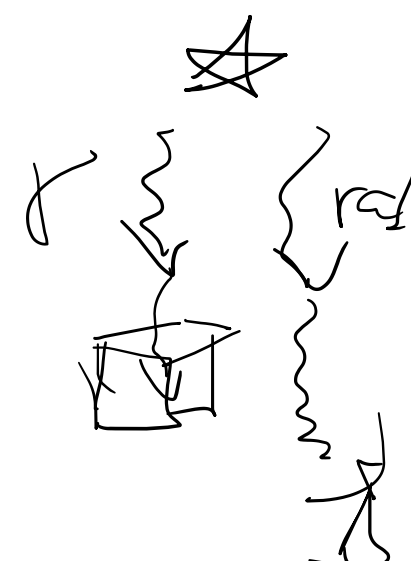
$$\frac{f_1}{f_2} = 100 \quad \Delta m / 5 = 3,52 \quad = 10^3 \approx 3,3 \cdot 10^3$$

$$\frac{f_1}{f_2} = \frac{S_2}{S_1}$$

$$D = 0,8 \text{ cm} \cdot \sqrt{3,3 \cdot 10^3} \approx 46 \text{ cm}$$

f ↓ ↓ ↓ ↓ ↓

$$0.5 \text{ мкг} = 1979$$



~~S₁~~ S₁ S₂ S₂

$$\Delta t \sim 0,1^s$$

$$E \sim 10^{46} \text{ эрг}$$

$$S = 10000 \text{ см}^2$$

3) Маркунтагы

$$h\nu = 100 \text{ кэВ}$$

d-?

а) 1 фотон б) 10 фотон

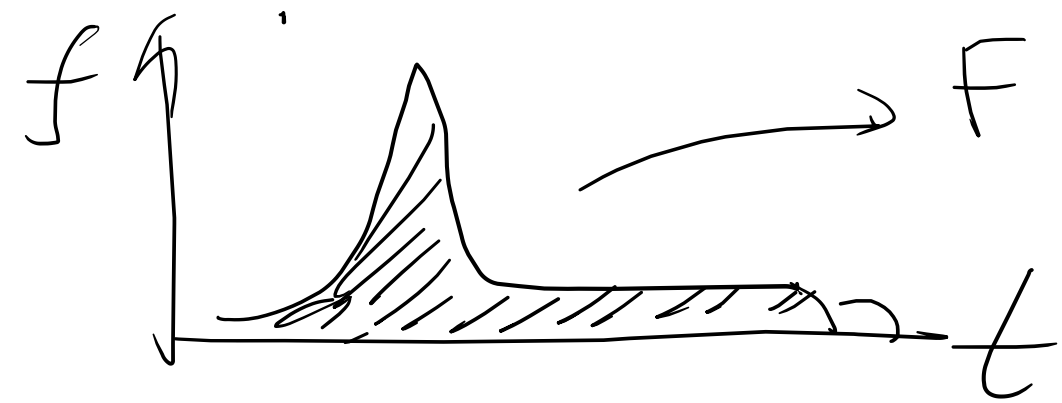
$$E_{\text{пл}} = 10^5 \cdot 1,6 \cdot 10^{-12} \text{ эрг} = 1,6 \cdot 10^{-7} \text{ эрг}$$

$$\left[\Phi_{\text{пл}} \right] = \text{эрг/см}^2$$

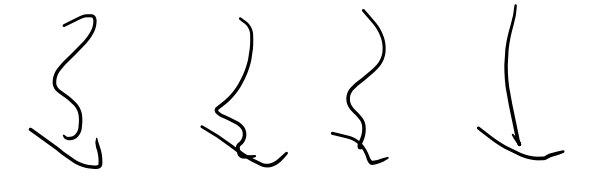
$$а) \Phi_{\text{пл}}^{(a)} = \frac{1,6 \cdot 10^{-7} \text{ эрг}}{10000 \text{ см}^2} = 1,6 \cdot 10^{-10} \text{ эрг/см}^2$$

$$б) \Phi_{\text{пл}}^{(b)} = 1,6 \cdot 10^{-9} \text{ эрг/см}^2$$

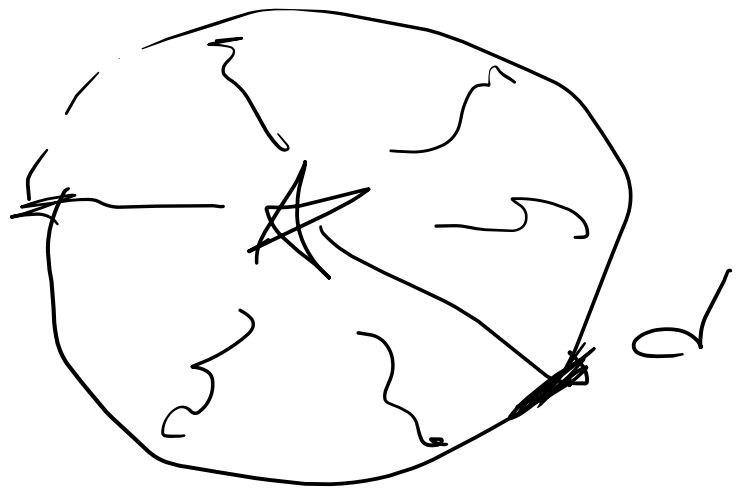
t₀



F Параллель



~~$f = \frac{L}{4\pi d^2}$~~
 $f = \frac{L}{4\pi d^2}$



$$d = \sqrt{\frac{L}{4\pi f_{\text{em}}}} = \sqrt{\frac{E}{4\pi F_{\text{em}}}}$$

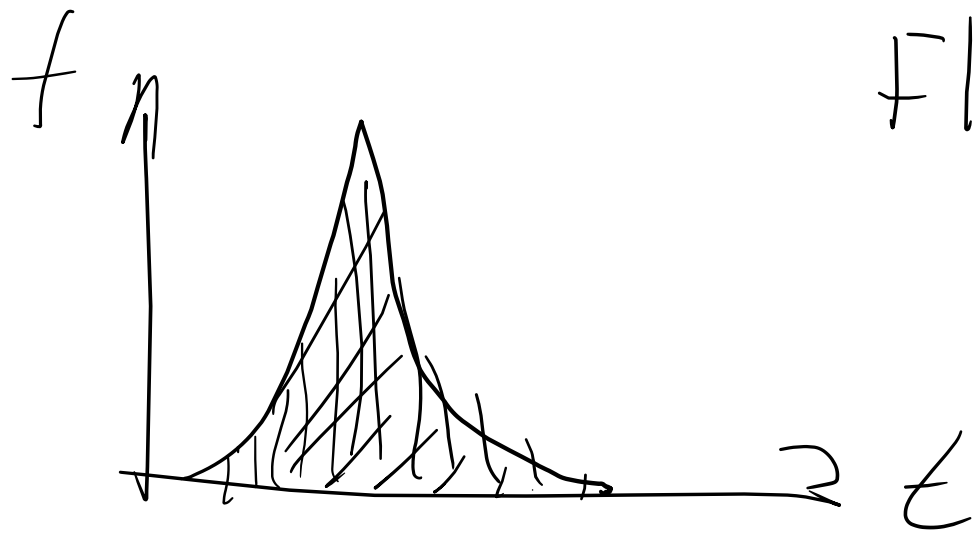
a) $= \sqrt{\frac{10^{46}}{4\pi \cdot 1,6 \cdot 10^{-10}}} = 2,2 \cdot 10^{27} \text{ cm} =$

$7,2 \cdot 10^8 \text{ pc} = 0,72 \text{ Gpc}$

b) $d = \frac{d^{(a)}}{\sqrt{10}} = 0,2 \text{ Gpc}$

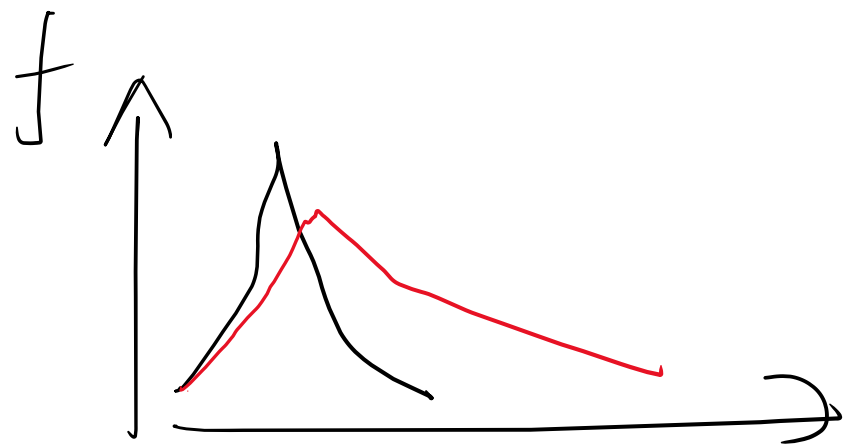
L - (Суммарная мощность)

$[L] = \frac{\text{J}^2}{\text{c}}$



$$\text{Fluence} = \int \text{flux} \cdot dt$$

$$[f] = \frac{\text{J}}{\text{cm}^2} \quad [F] = \frac{\text{J}}{\text{cm}^2 \cdot \text{s}}$$



~~$$F = \frac{f}{\text{cm}^2 \cdot \text{s}}$$~~

$$F = \frac{F}{\text{cm}^2 \cdot \text{s}} \cdot \Delta t$$

$$F_{\text{II}} = [C \cdot \Delta t] = \int_0^{\Delta t} f dt$$

(4)

$$D = 2,4 \text{ m}$$

$$n = 100 \text{ фотонов}$$

$$\Delta t = 600 \text{ сек}$$

$$S = \frac{1}{4} \left(\frac{D}{2} \right)^2$$

$$[f_n] = \frac{\text{фотоны}}{\text{см}^2 \cdot \text{с}}$$

$$f_{\text{меч}} \approx 10^6 \frac{\text{фотоны}}{\text{см}^2 \cdot \text{с}}$$

$$n = f_n \cdot S \cdot \Delta t$$

$$f_n = \frac{n}{S \cdot \Delta t} = \frac{100 \cdot 4}{\frac{1}{4} (240)^2 \cdot 600} = \frac{400}{600 \cdot \frac{1}{4} \cdot (2,4)^2 \cdot 10000} = \frac{1}{1,5 \cdot 7 \cdot 6 \cdot 10^4} = \frac{1}{3 \cdot 10^5}$$

$$\frac{f_n}{f_{\text{меч}}} = \frac{3 \cdot 10^{-6}}{10^6} = 3 \cdot 10^{-12}$$

$\rightarrow 3 \cdot 10^{11}$

$$\frac{30 \cdot 10^{10}}{3 \cdot 25}$$

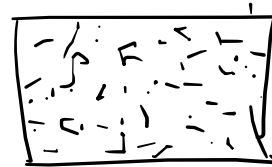
$$= 3 \cdot 10^{-6}$$

$$\Delta m = 28, \dots$$

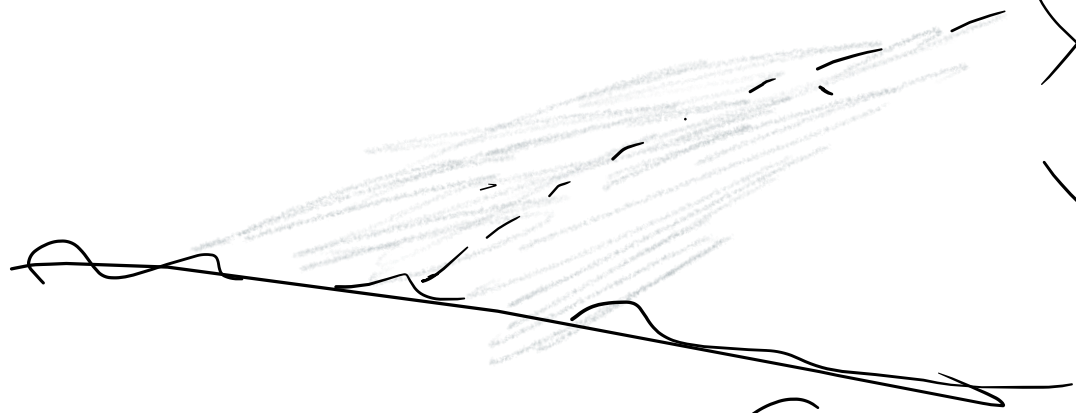
$$\Delta m \approx 28, \dots$$

$$m_{\text{полн}} = 28, \dots$$

Фон: 1. Аморфна



2. Зогнал. слат



3. Среден слой

4. Амрагатура

$$1'' \square \rightarrow \underline{\underline{22 \mu}}$$

$$\text{Hubble} \sim 10^{-3} \frac{\text{фот}}{\text{сек. пикс}}$$

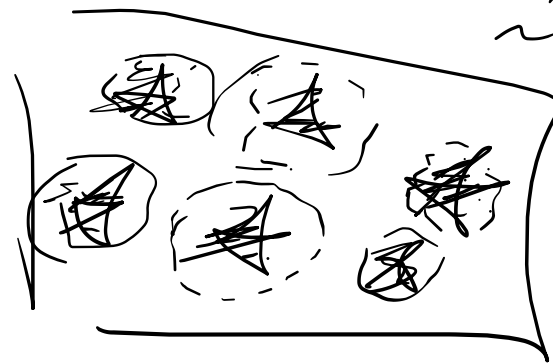
$$\textcircled{5} \rightarrow 1''$$

$$1 = 1,22 \cdot 206265 \cdot 6 \cdot 10^{-5} \rightarrow D_{cm}$$

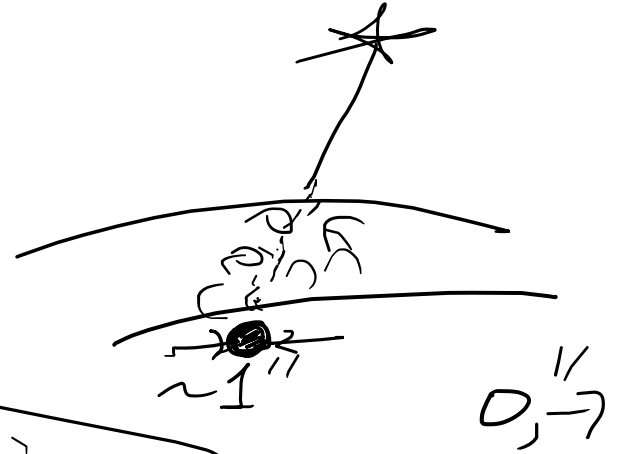
$$D = 1,22 \cdot 12 \approx 15 \text{ cm}$$

galaxy zoo

citizen science



$$\theta = 1,22 \frac{\lambda}{D}$$



$$8) \lambda = 21 \text{ cm} \quad D = 500 \text{ m}$$

$$\theta = 1,22 \cdot \frac{206265 \cdot 21}{5 \cdot 10^4} \approx \underline{\underline{100''}}$$

x y me, rer
y ranga.



H-70% (masses!)

SETI

