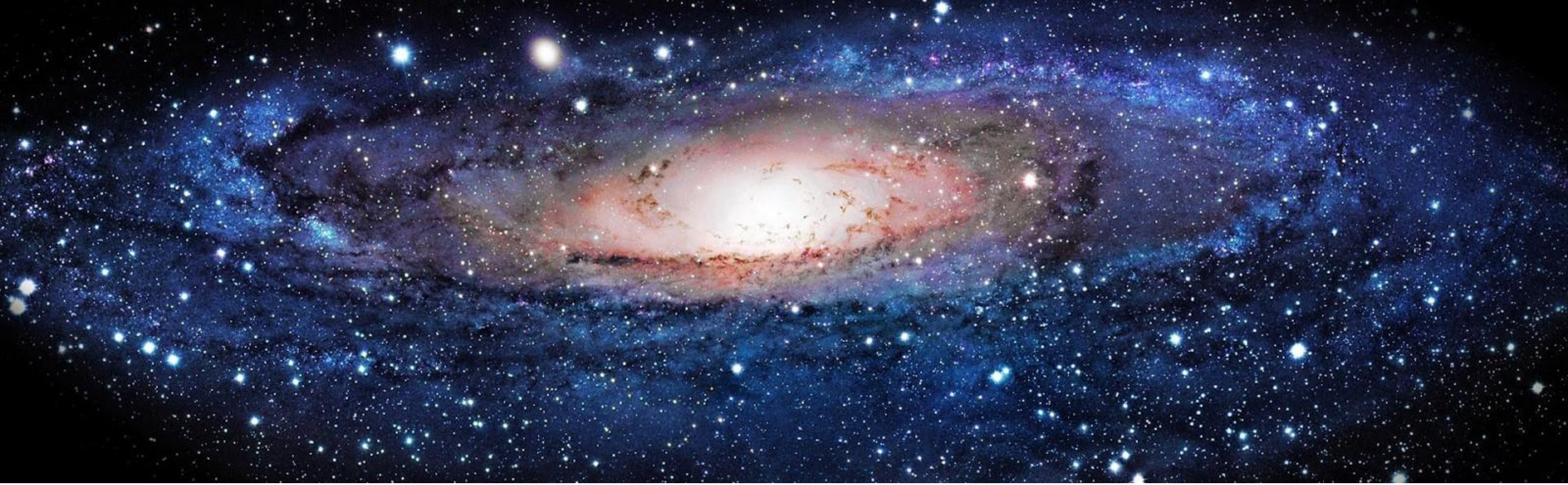


Модуль. Астрофизика.

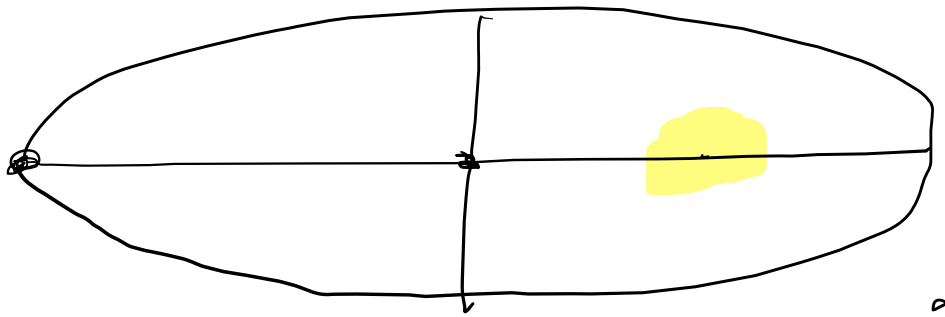
Семинар 2. (06.11)

1

$$P^2 = \frac{4\pi^2}{G(M_1+M_2)} a^3$$

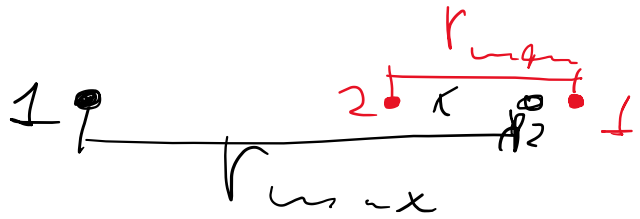
$M_1 < M_2$

O × O



$$2a = r_{min} + r_{max}$$

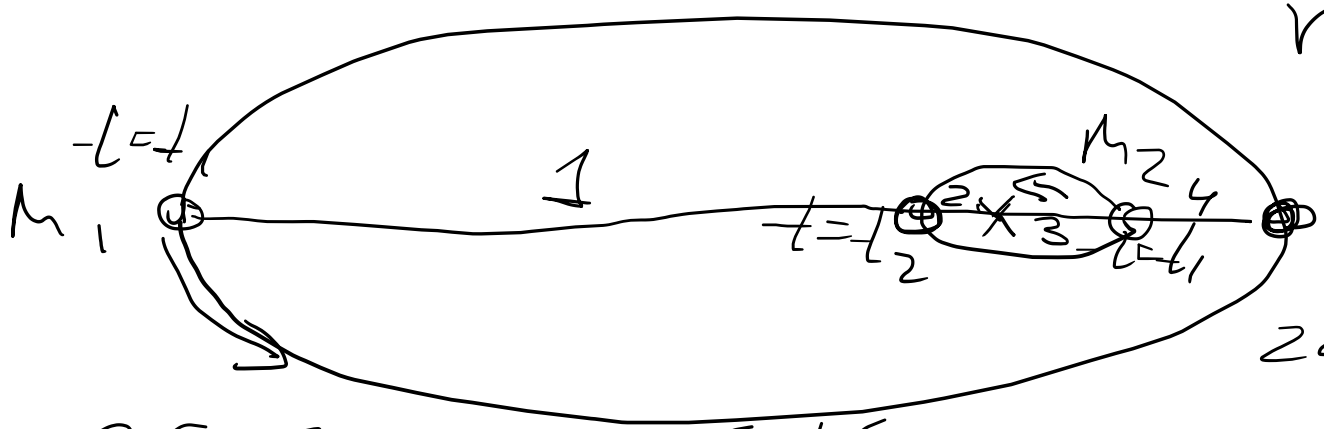
$$\underline{\underline{a = a_1 + a_2}}$$



$$M_1 a_1 = M_2 a_2$$

$$r_{max} = 1 + 2 + 3$$

$$r_{min} = 4 + 2 + 3$$



$2a = 2a_1 + 2a_2$ $\quad a = a_1 + a_2$

$$2a = 1+2+3+4+2+3$$

$$= \underbrace{4+1+2+3}_{2a_1} + \underbrace{2+3}_{2a_2}$$

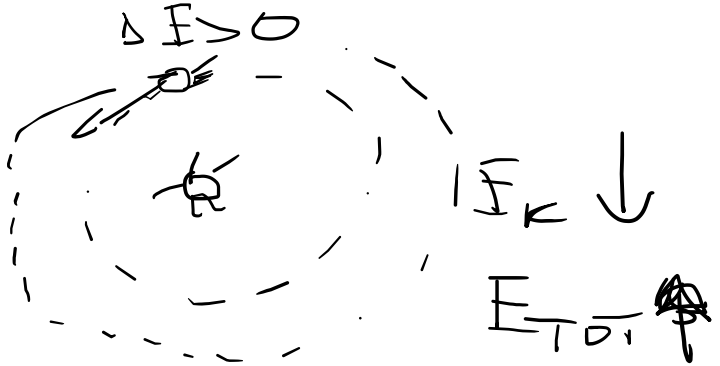
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \qquad e = \sqrt{1 - b^2/a^2}$$ dan

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \qquad e = \sqrt{1 + b^2/a^2}$$ hiper.

---

(2) $E_{TOT} = E_K + E_P$

TB $2E_K = -E_P$ $\Rightarrow$ $E_{TOT} < 0$ $= -E_K$



Марс vs. Венера

В. 0,72 ае

М. 1,52 ае

$$E_T = E_K + E_P = -E_K$$

$$E_K = \frac{mv^2}{2} = \frac{m}{2}\frac{GM}{a}$$

$m = 1$ (спутник)

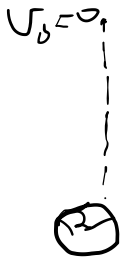
$$\frac{E_{KB}}{E_{K3}} = \frac{a_3}{a_B} = \frac{1}{0.72}$$

$$\Delta E = 1 - \frac{1}{0.72} = -0.39$$

$$\frac{E_{KM}}{E_{K3}} = \frac{a_3}{a_M} = \frac{1}{1.52}$$

$$\Delta E = \frac{1}{1.52} - 1 = -0.34$$

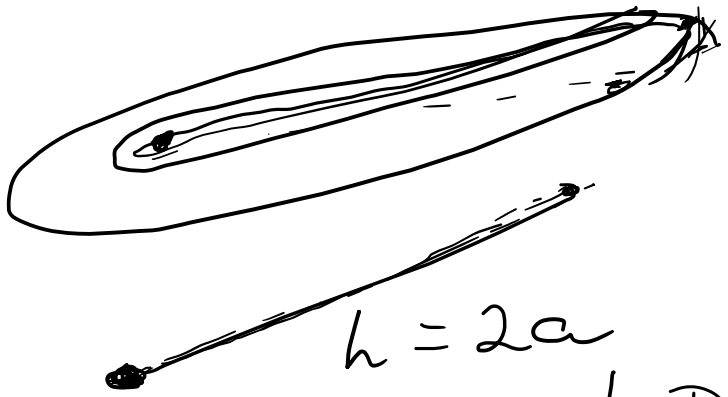
(3) Падение



$h \ll R$

$g = const$

$h \ll R$



$h = 2a$

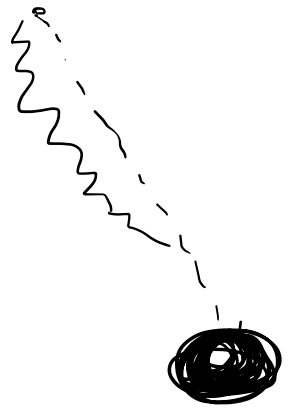
$a = \frac{h}{2}$

$T_{наб} = \frac{1}{2} T_{орб}$

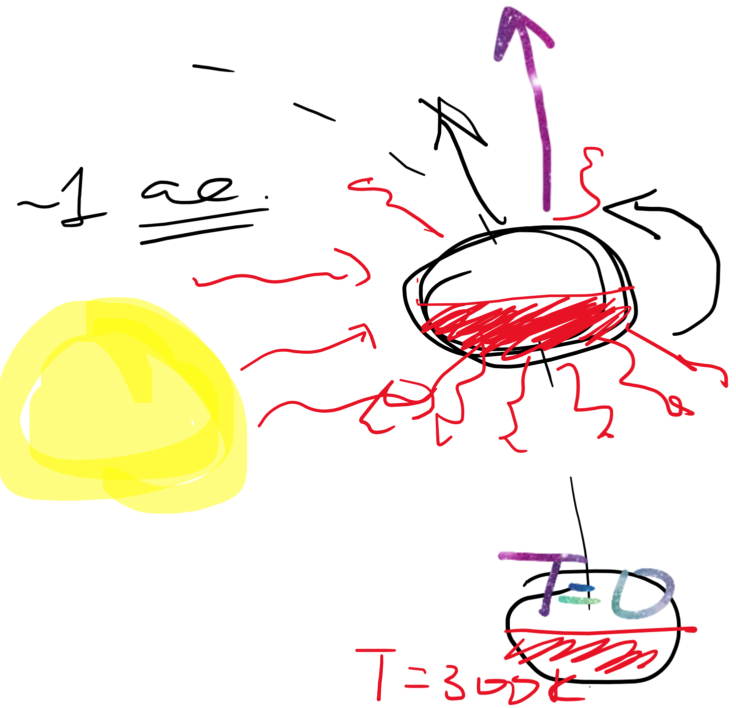
$$T_{наб}^2 = T_{орб}^2 = \frac{4\pi^2}{GM} \frac{h^3}{8}$$

$$T_{наб}^2 = \frac{\pi^2 h^3}{8GM}$$

$$T_{наб} = \sqrt{\frac{\pi^2 h^3}{8GM}}$$



④ Ярковский



$$S = 1\,км^2 = 10^{10}\,см^2$$

$$L = S \cdot \sigma T^4 \qquad T \simeq 300\,K$$

$$L = 10^{10} \cdot 5{,}67 \cdot 10^{-5} (300)^4 \simeq 4 \cdot 10^{15}\,\frac{эрг}{с}$$

$$E = N \cdot h\nu \qquad L = \dot{E}$$

$$\lambda = 10\,\mu m = 10^{-3}\,см \qquad \nu = 3 \cdot 10^{13}\,Гц$$

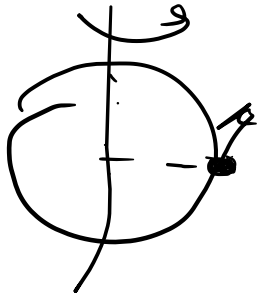
$$L(+\nu) \Rightarrow \dot{N} = 2 \cdot 10^{28}\,фот/сек$$

$$p = \frac{h\nu}{c} \qquad \frac{\Delta P}{\Delta t} = 10^5\,\frac{г \cdot см}{с^2}$$

$$1\,год \simeq \pi \cdot 10^7\,с$$

$$P = mv = V \cdot \rho \sqrt{\frac{GM}{a}} = \frac{4}{3} \cdot 10^{15} \cdot 4 \cdot 30 \cdot 10^5 = 5 \cdot 10^{22}\,\frac{г \cdot см}{с}$$

$$\Delta t = 5 \cdot 10^{17} \simeq 10^{10}\,лет$$



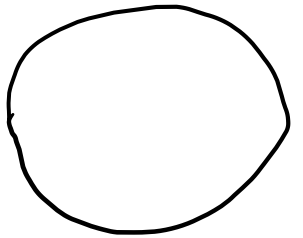
$$v_{\phi} = \omega R = \frac{2\pi}{P_{\phi}} R$$

$$P_{orb} = 2\pi \sqrt{\frac{R^3}{GM}} \sim$$

$$\frac{2\pi R}{P_{orb}} = \sqrt{\frac{GM}{R}}$$

$$\sim \frac{1}{\sqrt{\rho}}$$

5 Радиус неизвестного



$$F = G\frac{M_1 M_2}{R^2}$$

$$P = F/S$$

$$M_2 = \frac{1}{2} h S \rho$$

$$M_1 \sim R^3$$

$P_1 = P_2$

$$\frac{G M_1 M_2}{S_1 R_1^2} = \frac{G M_3 M_4}{S_2 R_2^2}$$

$M_3 \sim h_2$ $R_2 \sim h_2$

$$R_2 = \sqrt{R_1 h_1} = \sqrt{6400\ км \cdot 10\ км} \approx 253\ км$$

$R_1 h_1 = R_2 h_2$