

1 a.l.	=	$9,46 \times 10^{15}$ m
1 pc	=	3,26 a.l.
1 UA	=	$1,49 \times 10^{11}$ m
1 m_p	=	$1,67 \times 10^{-27}$ kg
1 M_\odot	=	$1,99 \times 10^{30}$ kg
1 L_\odot	=	$3,83 \times 10^{26}$ W
1 sir	=	$1,69 \times 10^{-7}$ W/m ²
c	=	3×10^8 m/s
G	=	$6,67 \times 10^{-11}$ N·m ² /kg ²
$K = 4\pi^2/G$	=	$5,92 \times 10^{11}$ s ² ·kg/m ³
h	=	$6,63 \times 10^{-34}$ J·s
σ	=	$5,67 \times 10^{-8}$ W/(m ² ·K ⁴)

$$\frac{1}{S} = \frac{1}{T_T} - \frac{1}{T_P} \qquad \frac{1}{S} = \frac{1}{T_P} - \frac{1}{T_T}$$

$$D(\text{a.l.}) = 3,26 / \theta(^{\circ})$$

$$I = \frac{L}{4\pi D^2} \qquad I(\text{sir}) = 2,02 \frac{L(L_\odot)}{D^2(\text{a.l.})}$$

$$L(L_\odot) = 400 P (\text{jours})$$

$$e = \frac{FF'}{PA} = \frac{FF'}{2a}$$

$$T^2(\text{an}) = a^3(\text{UA}) \qquad T^2 = K \frac{a^3}{M_c}$$

$$T^2 (\text{années}) = \frac{a^3(\text{UA})}{M_c(M_\odot)}$$

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad E = \gamma mc^2$$

$$\gamma_{\text{grav}} = \frac{1}{\sqrt{1 - \frac{v_{\text{lib}}^2}{c^2}}} \qquad E = mc^2$$

$$D_A = (1 + e)a \qquad D_P = (1 - e)a$$

$$\frac{v_P}{v_A} = \frac{D_A}{D_P}$$

$$v_P = v_m (1 + e) \qquad v_A = v_m (1 - e)$$

$$v_m = \frac{2\pi a}{T} (1 - e^2)^{-1/2} \qquad F = \frac{GMm}{r^2}$$

$$g = \frac{GM}{R^2} \qquad v_{\text{min}} = \sqrt{\frac{GM}{R}}$$

$$v_{\text{lib}} = \sqrt{\frac{2GM}{R}} \qquad v_{\text{circ}} = \sqrt{\frac{GM}{r}}$$

$$T = 1/f \qquad \lambda = cT \qquad E = hf$$

$$T(\text{K}) = T(^{\circ}\text{C}) + 273$$

$$\lambda_{\text{pic}} (\text{m}) = 2,90 \times 10^{-3} / T(\text{K})$$

$$\ell = \sigma T^4 \qquad L = \ell S$$

$$\delta = \lambda_{\text{obs}} / \lambda_{\text{norm}} \qquad \delta_D = 1 + \frac{v}{c}$$

$$\delta_{\text{DR}} = \gamma \delta_D \qquad \delta_{\text{grav}} = \gamma_{\text{grav}}$$

$$L_{\text{max}} = cT$$

$$\alpha(^{\circ}) = 2,5 \times 10^5 \lambda / D \qquad \alpha(^{\circ}) = 0,15 / D(\text{m})$$

$$R = c^2 (m_{\text{av}} - m_{\text{ap}}) / m_{\text{av}}$$

$$T^2 = K \frac{a_{\text{tot}}^3}{M_{\text{syst}}} \qquad \frac{a_1}{a_2} = \frac{v_1}{v_2} = \frac{m_2}{m_1}$$

$$R_s = 2GM/c^2 \qquad R_s (\text{km}) = 3 M(M_\odot)$$

$$\Delta a = 2Gmh / d^3$$

$$H_A = 65 (\text{km/s})/\text{Mpc} = 2,1 \times 10^{-18} \text{ s}^{-1} \\ = 6,6 \times 10^{-11} \text{ a}^{-1} = 66 (\text{nm/a})/\text{km}$$

$$v_A = H_A D_A \qquad \delta = 1/e$$

$$T_A = 2,73 \text{ K} \qquad T = T_A/e$$

$$H ((\text{km/s})/\text{Mpc}) = 30 \sqrt{\rho_m (m_p/m^3)}$$

$$\rho_m = \rho_{m\Lambda} / e^3$$

$$t = \frac{2}{3H} \qquad e = (t/t_A)^{2/3}$$

$$d (\text{Ga.l.}) = 30 e (1 - \sqrt{e}) \qquad D (\text{Ga.l.}) = 30 (1 - \sqrt{e})$$

$$R_{\text{uo}} (\text{a.l.}) = 3 t (\text{a})$$

$$t = 1,44 T_{1/2} \ln ((E/P) + 1))$$

$$T_{\text{éq}} (\text{K}) = 280 [(1-A) L(L_\odot) / D^2 (\text{UA})]^{1/4}$$

$$v_{\text{moy}} = 146 \sqrt{T(\text{K})/m(m_p)} \qquad R = v_{\text{lib}}/v_{\text{moy}} > 10$$