

FEUILLE DE FORMULES

$$1 \text{ UA} = 1,49 \times 10^{11} \text{ m}$$

$$1 \text{ al} = 9,46 \times 10^{15} \text{ m}$$

$$1 \text{ pc} = 3,26 \text{ al}$$

$$1 M_{\odot} = 1,99 \times 10^{30} \text{ kg}$$

$$1 R_{\odot} = 6,96 \times 10^8 \text{ m}$$

$$1 L_{\odot} = 3,83 \times 10^{26} \text{ W}$$

$$1 \text{ sir} = 1,69 \times 10^{-7} \text{ W/m}^2$$

$$F_g = \frac{GMm}{r^2}$$

$$G = 6,67 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$$

$$K = 5,92 \times 10^{11} \text{ s}^2 \cdot \text{kg/m}^3$$

$$c = 3 \times 10^8 \text{ m/s}$$

$$h = 6,63 \times 10^{-34} \text{ J} \cdot \text{s}$$

$$\sigma = 5,67 \times 10^{-8} \text{ W}/(\text{m}^2 \cdot \text{K}^4)$$

$$m_p = 1,67 \times 10^{-27} \text{ kg}$$

$$g = \frac{GM}{r^2}$$

$$M_T = 5,97 \times 10^{24} \text{ kg}$$

$$R_T = 6,37 \times 10^6 \text{ m}$$

$$M_L = 7,35 \times 10^{22} \text{ kg}$$

$$R_L = 1,74 \times 10^6 \text{ m}$$

$$d_{TL} = 3,84 \times 10^8 \text{ m}$$

$$\Delta a = \frac{2GMR}{d^3}$$

$$\frac{1}{S} = \left| \frac{1}{T_T} - \frac{1}{T_P} \right|$$

$$D[\text{al}] = \frac{3,26}{\theta["]}$$

$$I = \frac{L}{4\pi D^2}$$

$$I[\text{sir}] = \frac{2,02L[L_{\odot}]}{D^2[\text{al}]}$$

$$L[L_{\odot}] = 400P[\text{jr}]$$

$$e = \frac{\overline{F_1 F_2}}{PA} = \frac{\overline{F_1 F_2}}{2a}$$

$$D_P = a(1 - e)$$

$$D_A = a(1 + e)$$

$$a = \frac{D_P + D_A}{2}$$

$$v_P = v_m(1 + e)$$

$$v_A = v_m(1 - e)$$

$$v_m = \frac{v_P + v_A}{2}$$

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

$$v_m = \frac{2\pi a}{T\sqrt{1 - e^2}}$$

$$T^2 = \frac{Ka^3}{M}$$

$$T^2[\text{an}] = \frac{a^3[\text{UA}]}{M[M_{\odot}]}$$

$$v_{\text{lanc}} = \sqrt{\frac{(1 + e)GM}{r}}$$

$$v_{\text{circ}} = \sqrt{\frac{GM}{r}}$$

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

$$E = K + U$$

$$K = \frac{1}{2}mv^2$$

$$U_g = -\frac{GMm}{r}$$

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

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

$$v=v_0+v_{\rm ex}\ln\frac{M_0}{M}\qquad\qquad\vec{F}_{\rm P}=\frac{{\rm d}M}{{\rm d}t}\vec{v}_{\rm ex}\qquad\qquad v=v_0+v_{\rm ex}\ln\frac{M_0}{M}-gt\qquad\qquad g'=\frac{n}{m}$$

$$c=\lambda f\qquad\qquad T=\frac{1}{f}\qquad\qquad E=hf$$

$$\lambda_{\rm max}=\frac{0,0029}{T}\qquad\qquad \ell=\sigma T^4\qquad\qquad L=\ell A$$

$$\delta=\frac{\lambda}{\lambda_0}\qquad\qquad \delta_{\rm D}=1\pm\frac{v}{c}\qquad\qquad \delta_{\rm DR}=\mathscr{R}\delta_{\rm D}\qquad\qquad \delta_{\rm grav}=\mathscr{R}_{\rm grav}$$

$$\frac{S}{B}\propto\sqrt{t_{\rm exp}}\qquad\qquad \frac{S}{B}\propto D\qquad\qquad \alpha_{\rm lim}[{}^{\circ}]=\frac{2,5\times10^5\,\lambda}{D}$$

$$E=mc^2\qquad\qquad R=\left(\frac{m_{\rm av}-m_{\rm ap}}{m_{\rm av}}\right)c^2$$

$$T^2=\frac{Ka_{\rm tot}^{}^3}{M_{\rm tot}}\qquad\qquad \frac{\alpha_1}{\alpha_2}=\frac{v_1}{v_2}=\frac{m_2}{m_1}$$

$$R_{\rm s}=\frac{2GM}{c^2}\qquad\qquad \Delta a=\frac{2GMh}{d^3}$$

$$v=HD$$

$$H_{\rm A}=65\;({\rm km/s})/{\rm Mpc}=66\;({\rm nm/an})/{\rm km}=2,1\times10^{-18}\;{\rm s}^{-1}=6,6\times10^{-11}\;{\rm an}^{-1}$$

$$\delta=\frac{1}{e}\qquad\qquad T=\frac{T_{\rm A}}{e}\qquad\qquad T_{\rm A}=2,73\;{\rm K}$$

$$H\bigl[({\rm km/s})/{\rm Mpc}\bigr]=30\sqrt{\rho_{\rm m}\bigl[m_{\rm p}/{\rm m}^3\bigr]}$$

$$\rho_{\rm m}=\frac{\rho_{\rm m\Lambda}}{e^3}\qquad\qquad e=\left(\frac{t}{t_{\rm A}}\right)^{2/3}\qquad\qquad H=\frac{2}{3t}$$

$$d[{\rm Gal}]=30e\bigl(1-\sqrt{e}\bigr)\qquad\qquad D[{\rm Gal}]=30\bigl(1-\sqrt{e}\bigr)\qquad\qquad R_{\rm uo}[{\rm al}]=3t[{\rm an}]$$