- **Unidad** O2–Astrofísica, estrellas y planetas
- **Clase** U02 C05 - 9/16
- **Fecha** 30 Sep 2020
- **Cont** Planetas y Vida
- **Cátedra** Asorey
- **Web** https://gitlab.com/asoreyh/unrn-ipac/

RIO NEGRO

Notas de clase

$\epsilon = 0 \rightarrow$ círculo

$0 < \epsilon < 1 \rightarrow$ elipse

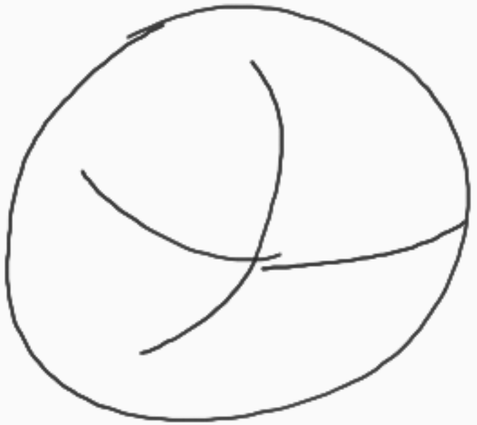
$\epsilon = 1$ parábola

$\epsilon > 1$ hipérbola

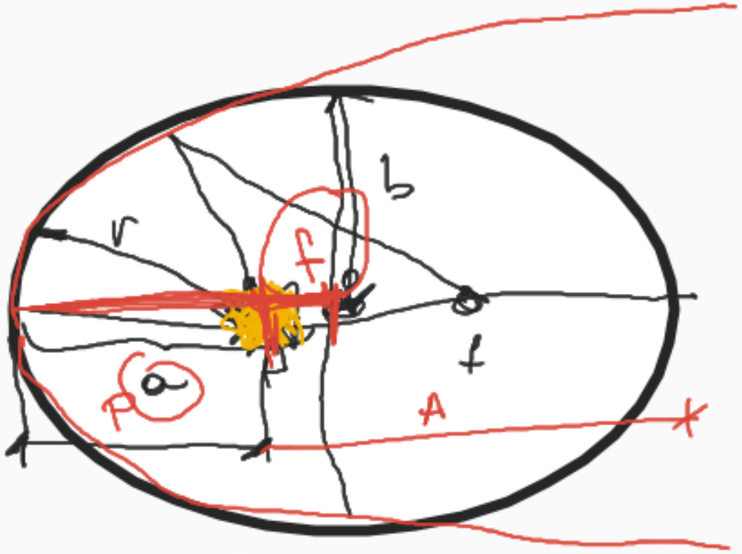
$$\epsilon = \sqrt{1 - \frac{b^2}{a^2}}$$

$a \rightarrow \infty$

$b \rightarrow 0$



Física.



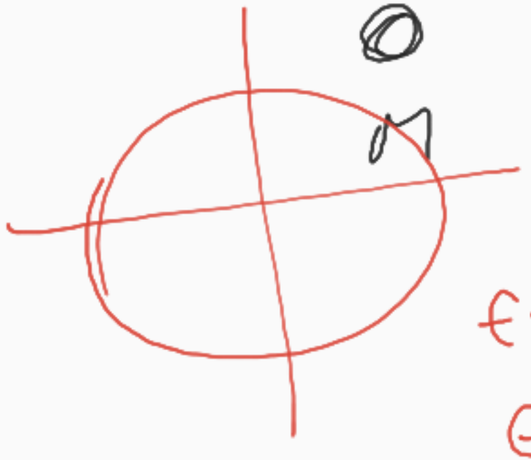
Periastro

Apoastro

$A + P = 2a$

$$a = \frac{A+P}{2}$$

$M \gg m$



$0 \leq \epsilon < 1$

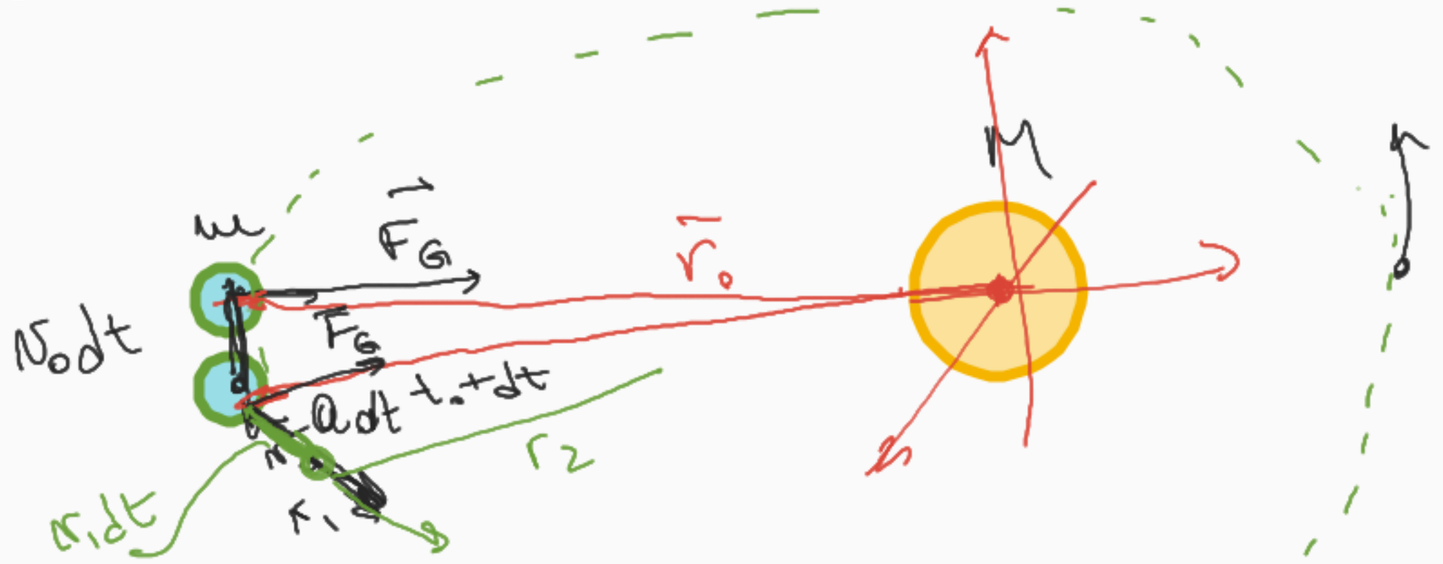
$\epsilon = 0 \rightarrow$ círculo

$\epsilon = 1 \rightarrow$ parábola

$\epsilon > 1 \rightarrow$

$t = 0$

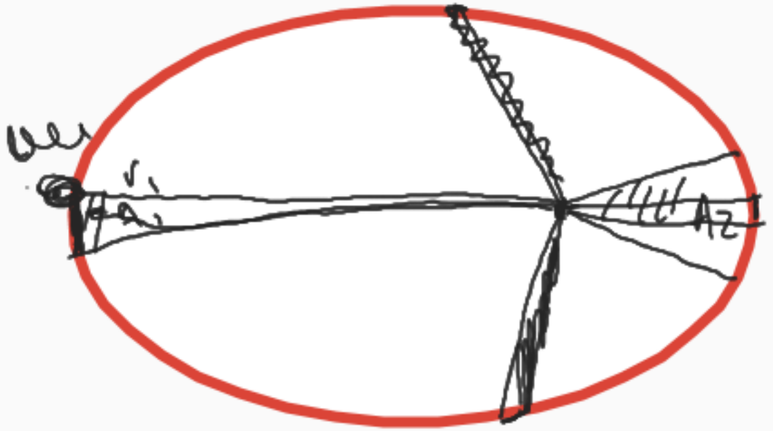
dt



$m \ll M$

$$\vec{F}_G = -\frac{G M m}{r^2}\,\hat{r}$$

$dt \rightarrow \Delta t$



$$\frac{A_1}{t} = \frac{A_2}{t}$$

$$\frac{dA_1}{dt} = \frac{dA_2}{dt}$$

$$\frac{r_1 \frac{dx_1}{2dt}}{} = \frac{r_2 d\lambda_2}{2dt}$$

$$r_1 v_1 = r_2 v_2$$

$$m r_1 v_1 = m r_2 v_2$$

$(L_1 = L_2)$ — Conservación del Mom. Angular.

$$v_1 r_1 = v_2 \cdot r_2$$

$$\Rightarrow v_1 = r_2 \left(\frac{r_2}{r_1}\right)$$

A = Afelio ; P = Perihelio.

$$v_p = v_A \cdot \left(\frac{r_A}{r_p}\right) \quad (1) \qquad a = \frac{r_p + r_A}{2} \quad (2)$$

$v_p > v_A \quad r_A > r_p$

$m \ll M$

$E_0 = E_K + E_G$

$$E_0 = \frac{1}{2} m v_r^2 - \frac{GMm}{r} = cte.$$

μ

$$\frac{1}{2}\mu v_A^2 - \frac{GM\mu}{r_A} = \frac{1}{2}\mu v_p^2 - \frac{GM\mu}{r_p} \Rightarrow \frac{v_A^2}{2} - \frac{GM}{r_A} = \frac{v_p^2}{2} - \frac{GM}{r_p} \Rightarrow \frac{v_A^2}{2} - \frac{v_p^2}{2} = \frac{GM}{r_A} - \frac{GM}{r_p}$$

$$\frac{v_A^2}{2} - \frac{v_A^2}{2}\frac{r_A^2}{r_p^2} = GM\left(1/r_A - 1/r_p\right) \Rightarrow \frac{v_A^2}{2}\left(1 - \frac{r_A^2}{r_p^2}\right) = GM\left(\frac{1}{r_A} - \frac{1}{r_p}\right) \Rightarrow \frac{v_A^2}{2}\left(\frac{r_p^2 - r_A^2}{r_p^2}\right) = GM\left(\frac{r_p - r_A}{r_p r_A}\right)$$

$$\Rightarrow \frac{v_0^2}{2} = GM\left(\frac{r_p - r_A}{r_p r_A}\right)\left(\frac{r_p^2}{r_p^2 - r_A^2}\right) \Rightarrow \frac{v_A^2}{2} = GM\left(\frac{r_p - r_A}{r_A}\right)\left(\frac{r_p}{(r_p - r_A)(r_p + r_A)}\right) = GM\,\frac{r_p}{r_A(r_p + r_A)} = GM\left(\frac{2a - r_A}{r_A \cdot 2a}\right) = \frac{v_A^2}{2}$$

$$\Rightarrow v^2 = GM\left(\frac{2a}{a\,r_A} - \frac{r_A}{r_A\,a}\right) \Rightarrow v_A^2 = GM\left(\frac{2}{r_A} - \frac{1}{a}\right) \Rightarrow v_A = \sqrt{GM\left(\frac{2}{r_A} - \frac{1}{a}\right)}$$

$$\Rightarrow \boxed{v_0(r) = \sqrt{GM\left(\frac{2}{r} - \frac{1}{a}\right)}}$$

Ec. de Vis-Viva.

Si $r = a$

$$v_0 = \sqrt{\frac{GM}{r}}$$

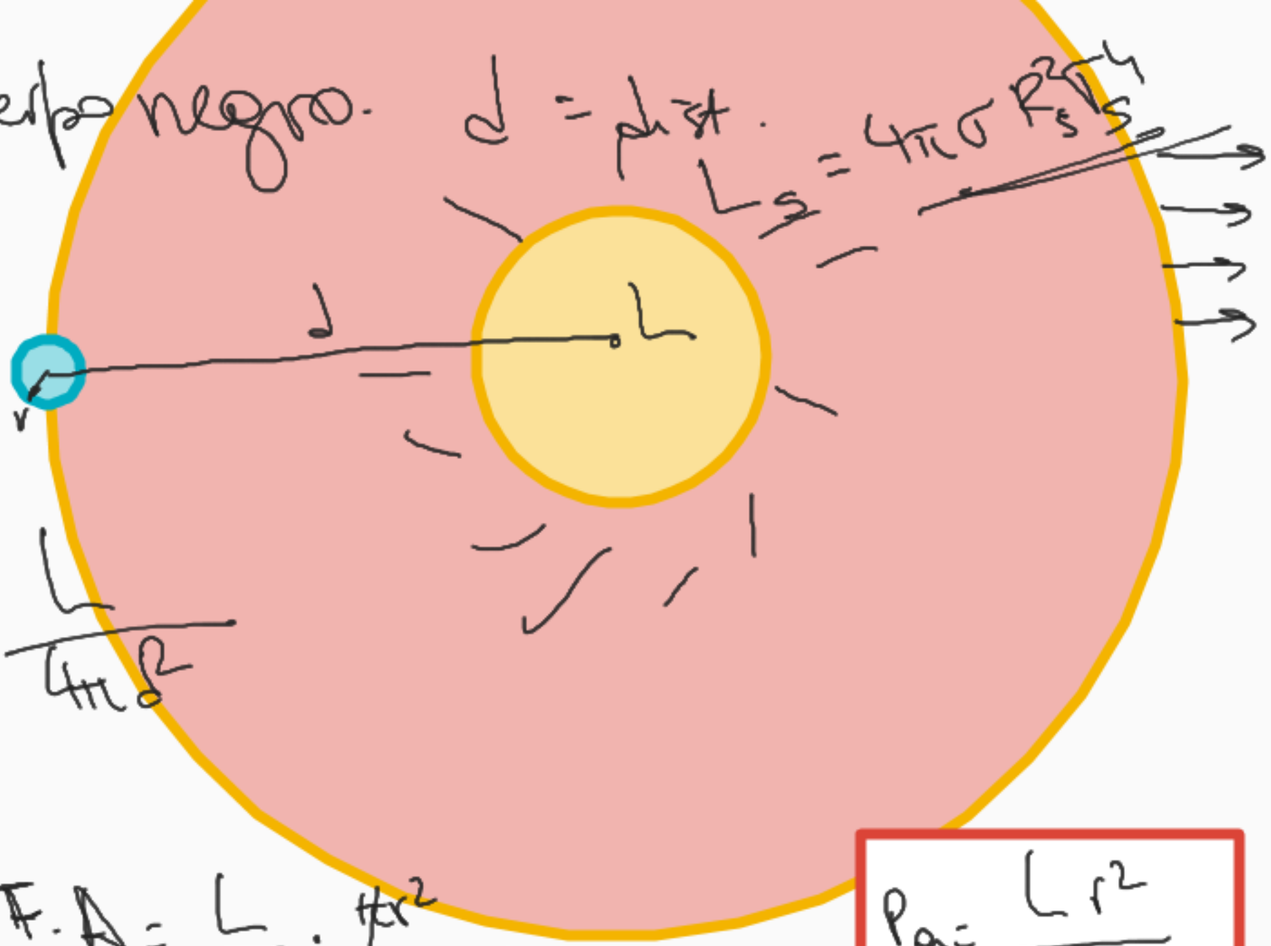
$$E_0 = \left(\frac{v^2}{2} - \frac{GM}{r}\right)\mu \Rightarrow \frac{E_0}{\mu} = \frac{1}{2}\left[GM\left(\frac{2}{r} - \frac{1}{a}\right)\right] - \frac{GM}{r}$$

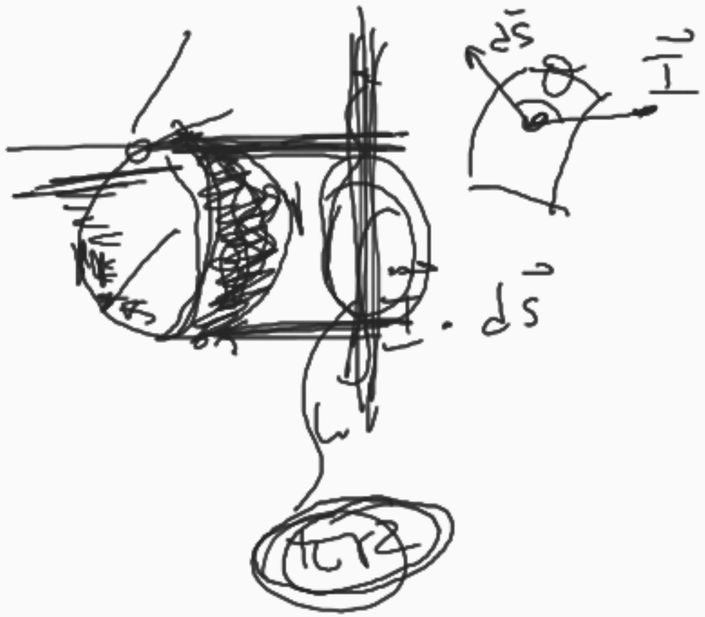
$$= \frac{1}{2}\frac{GM2}{r} - \frac{1}{2}\frac{GM}{a} + \frac{GM}{r}$$

$$\boxed{E_0 = -\frac{GM\mu}{2a}} = \text{cte}$$

Cuerpo negro. d = dist.

$L_S = 4\pi\sigma R_S^2 T_S^4$





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

$$P_a = F \cdot A = \frac{L}{4\pi d^2} \cdot 4\pi r^2 \Rightarrow$$

$$\boxed{P_a = \frac{L r^2}{4 d^2}}$$

$T_p \Rightarrow$ $\boxed{P_e = 4\pi\sigma r^2 T_p^4}$

$P_a = P_e \Rightarrow \frac{L r^2}{4 d^2} = 4\pi\sigma r^2 T_p^4 \Rightarrow T_p^4 = \frac{L}{16\pi\sigma d^2}$

$\Rightarrow d^2 = \frac{L}{16\pi\sigma T_p^4} \Rightarrow$ $\boxed{d = \sqrt{\frac{L}{16\pi\sigma T_p^4}}}$

$\Rightarrow$ $\boxed{T_p = \sqrt[4]{\frac{L}{16\pi\sigma d^2}}}$

Kepler → burbujas estelar

Corot → tránsito

COROT

mission

Kepler mission