Disque

Distribution matière : ρ Distribution matière visible ρ_v

$$v_R = \sqrt{\frac{Gm(r)}{r}}, m(r) = \int_0^r \rho(r')dV(r') \tag{1}$$

$$\vec{v} = (-v_R \sin\theta, v_R \cos\theta, 0) + \vec{v_0} \tag{2}$$

$$v_d = \vec{v} \cdot \vec{los} \tag{3}$$

$$I(v, v+\Delta v) = \int_{\mathcal{V}} \rho_v dV, \mathcal{V} = \{\vec{r}, v \leq v_d(\vec{r}) \leq v + \Delta v\}, \tag{4}$$

Ellipse

Un élément de matière suit une trajectoire elliptique (a, b).

$$\frac{1}{2}\dot{r}^2 + \frac{L^2}{2r^2} + \frac{Gm(r)}{r} = \frac{L^2}{2a^2} + \frac{Gm(a)}{a} \tag{5}$$

$$L^2 = \frac{GMb^2}{a} = pGM = r^4\dot{\theta}^2 \tag{6}$$

$$\vec{v} = (-r\dot{\theta}\sin\theta, r\dot{\theta}\cos\theta, 0) + (\dot{r}\cos\theta, \dot{r}\sin\theta, 0) + \vec{v_0} \tag{7}$$

$$r = \frac{p}{1 + e\cos\theta} \tag{8}$$

$$p = \frac{b^2}{a}, e = \frac{\sqrt{a^2 - b^2}}{a} \tag{9}$$