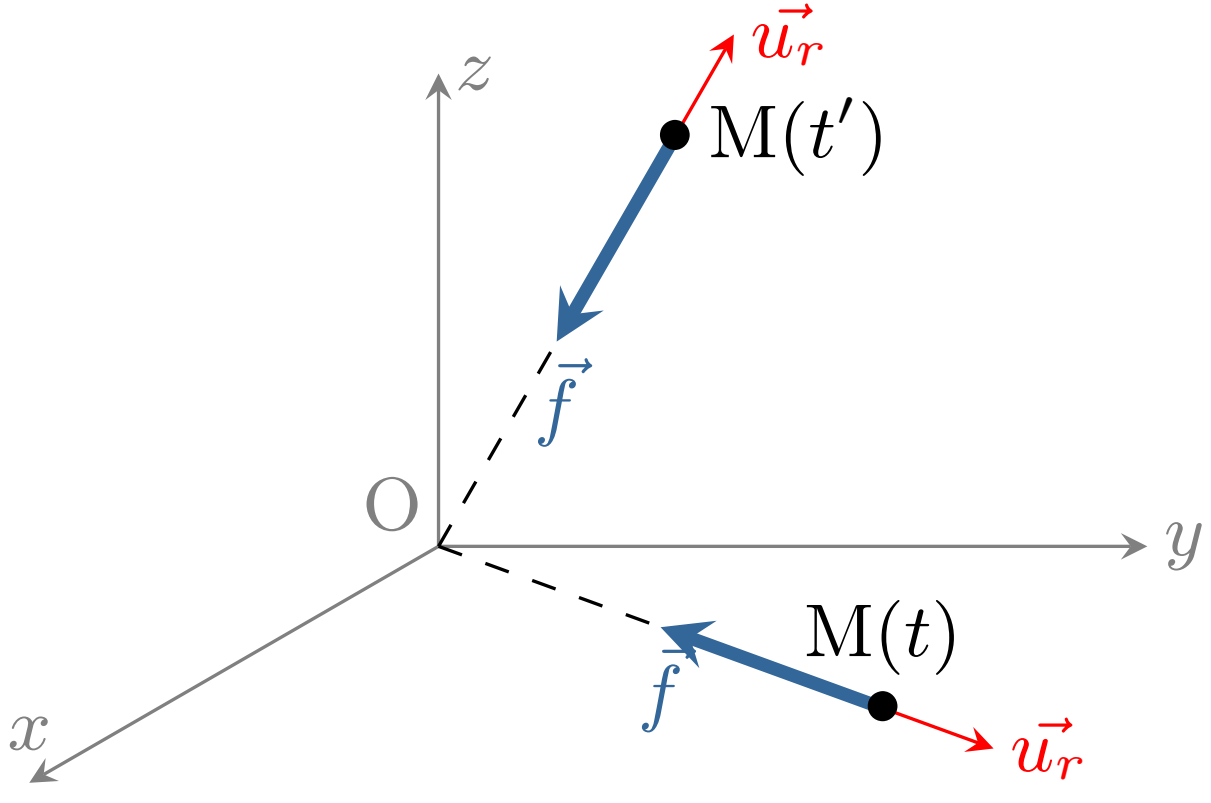
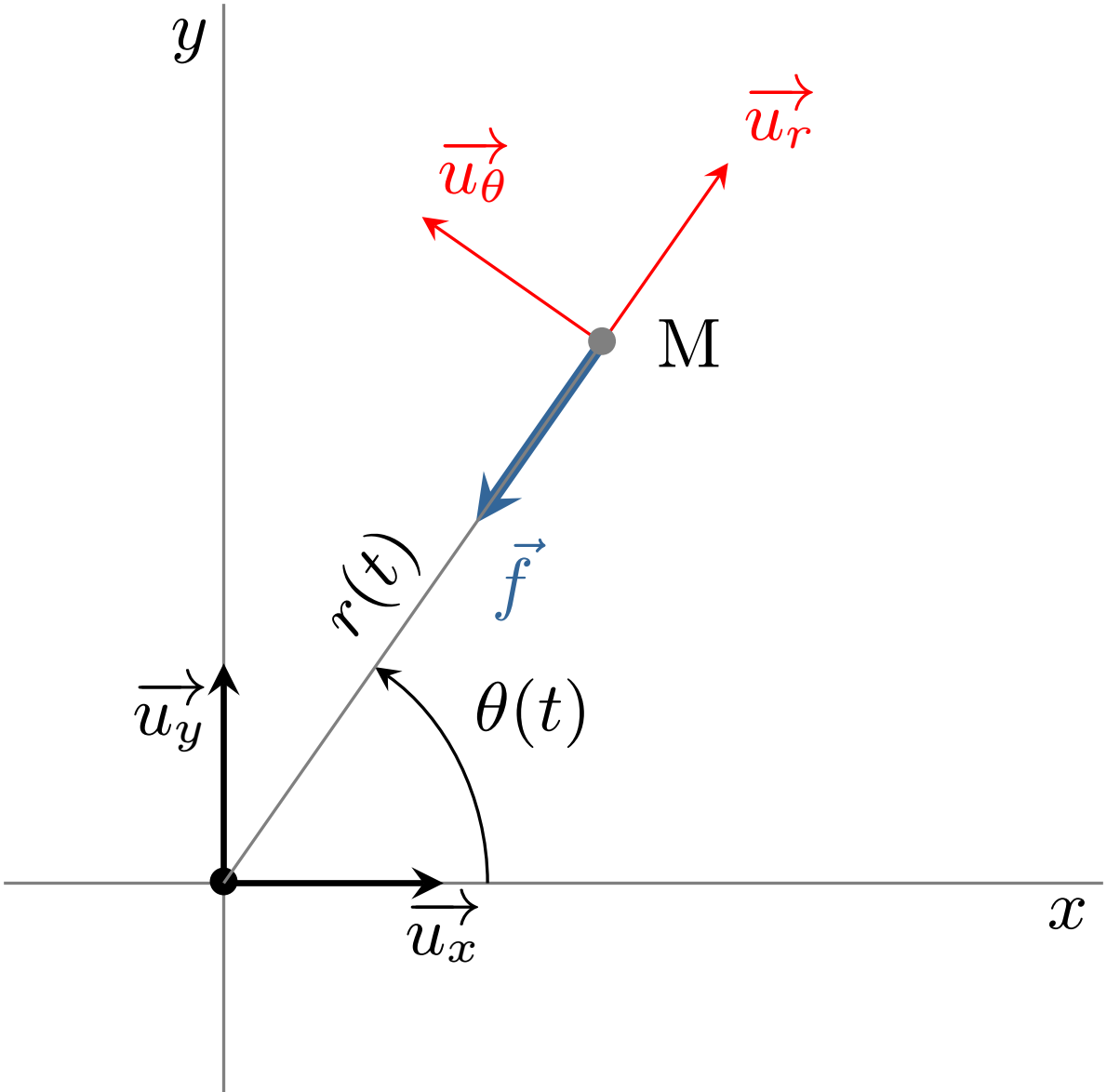
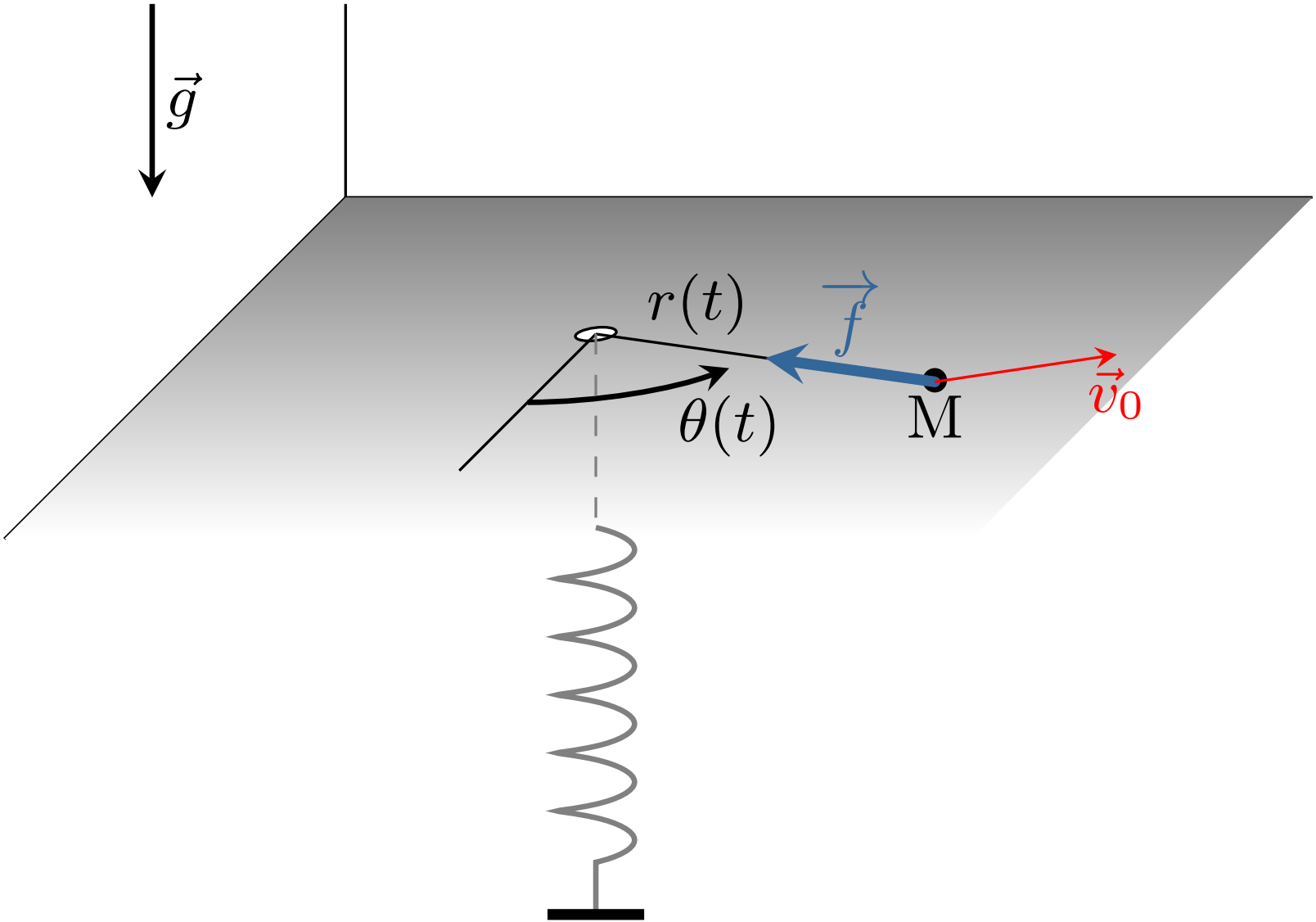
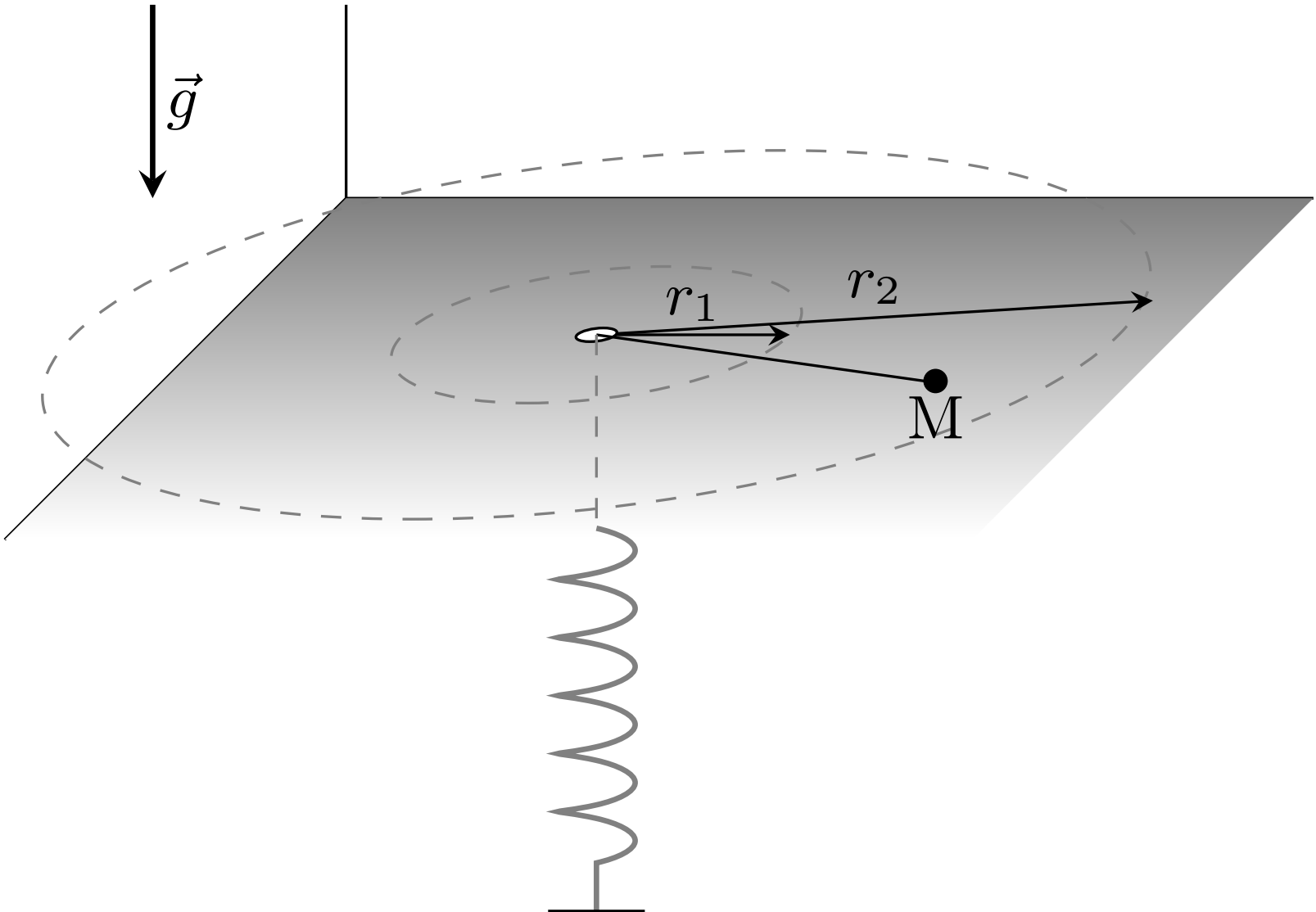
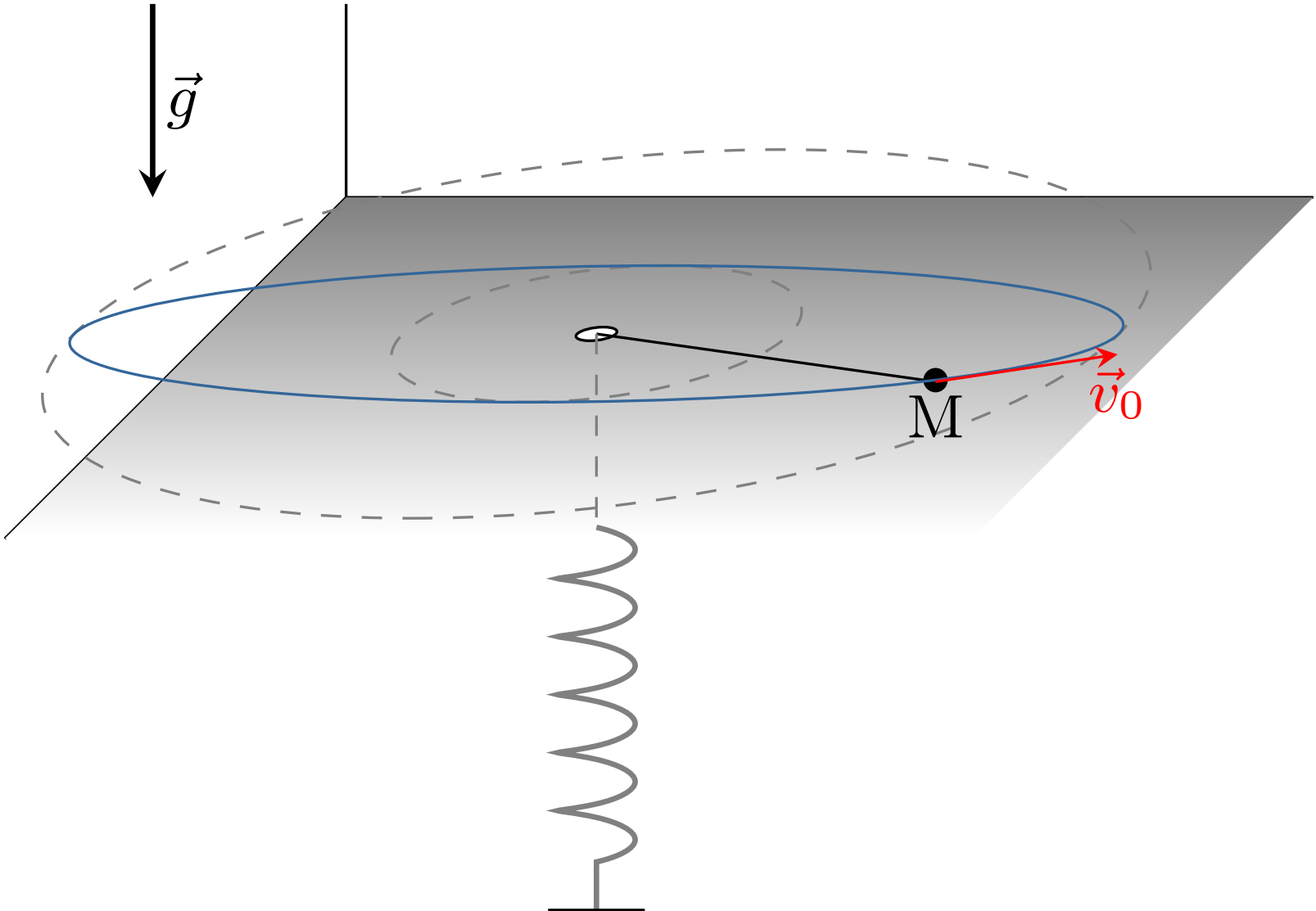
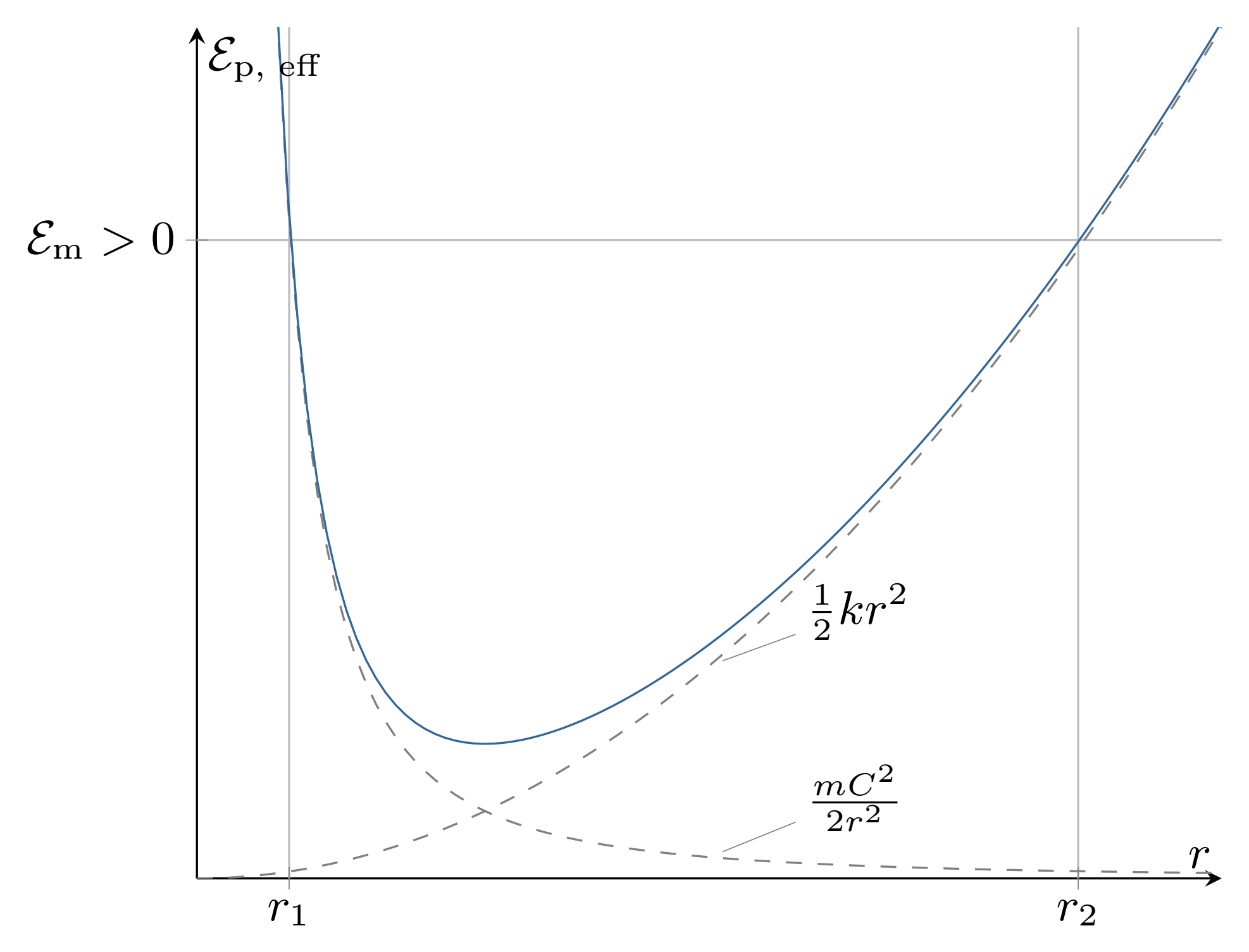

$\vec{u_r}$
z
$\mathrm{M}(t')$
$\vec{f}$
O
y
$\mathrm{M}(t)$
$\vec{f}$
x
$\vec{u_r}$

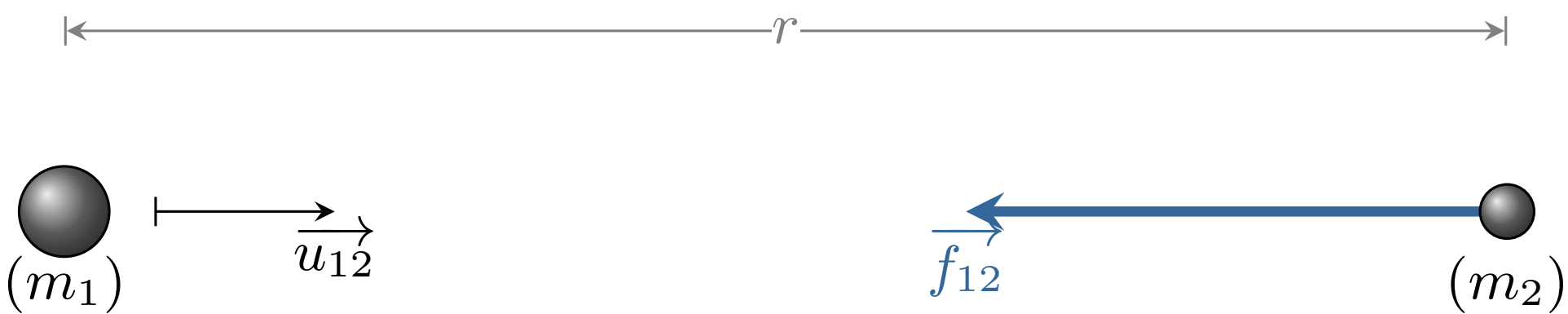

y
$\overrightarrow{u_r}$
$\overrightarrow{u_\theta}$
M
$\vec{f}$
$r(t)$
$\theta(t)$
$\overrightarrow{u_y}$
$\overrightarrow{u_x}$
x


$\vec{g}$
$r(t)$
$\vec{f}$
$\theta(t)$
M
$\vec{v}_0$

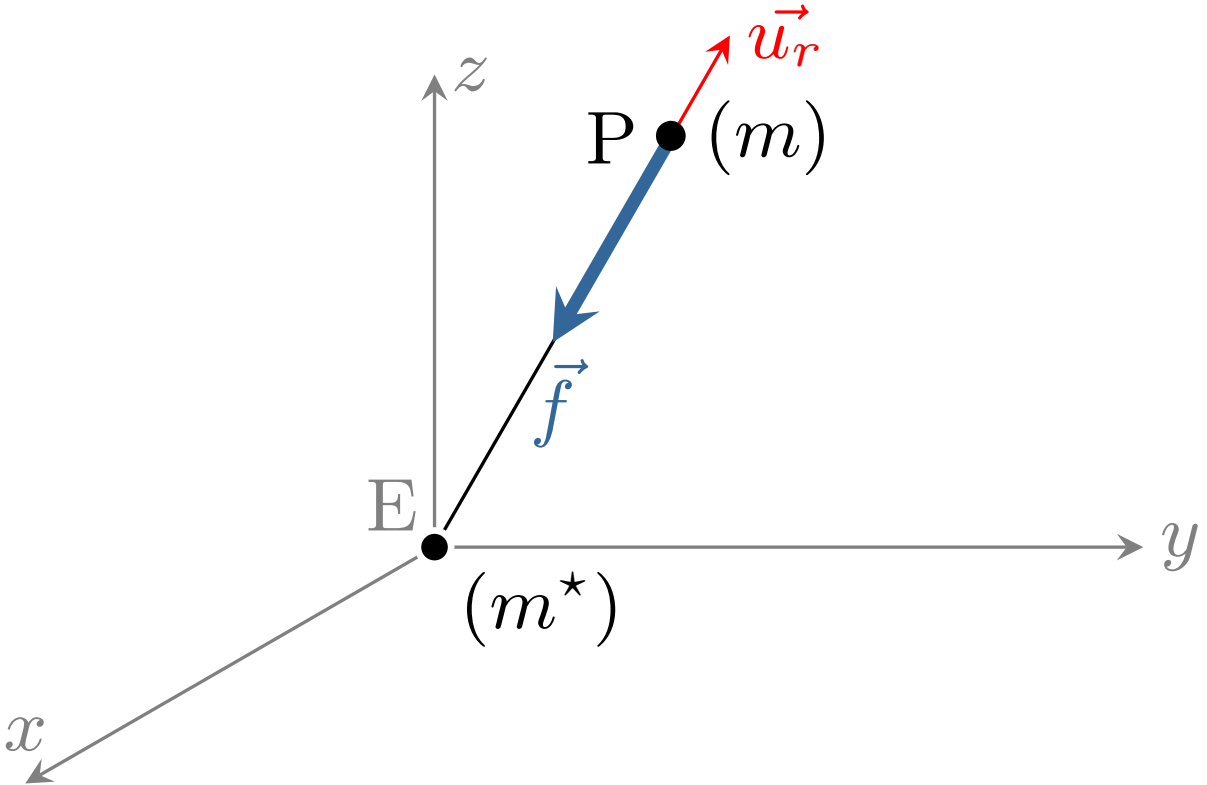

$\vec{g}$
r_1
r_2
M


$\vec{g}$
M
$\vec{v}_0$


$\mathcal{E}_{\mathrm{p,\,eff}}$
$\mathcal{E}_{\mathrm{m}} > 0$
$\frac{1}{2}kr^2$
$\frac{mC^2}{2r^2}$
r
r_1
r_2

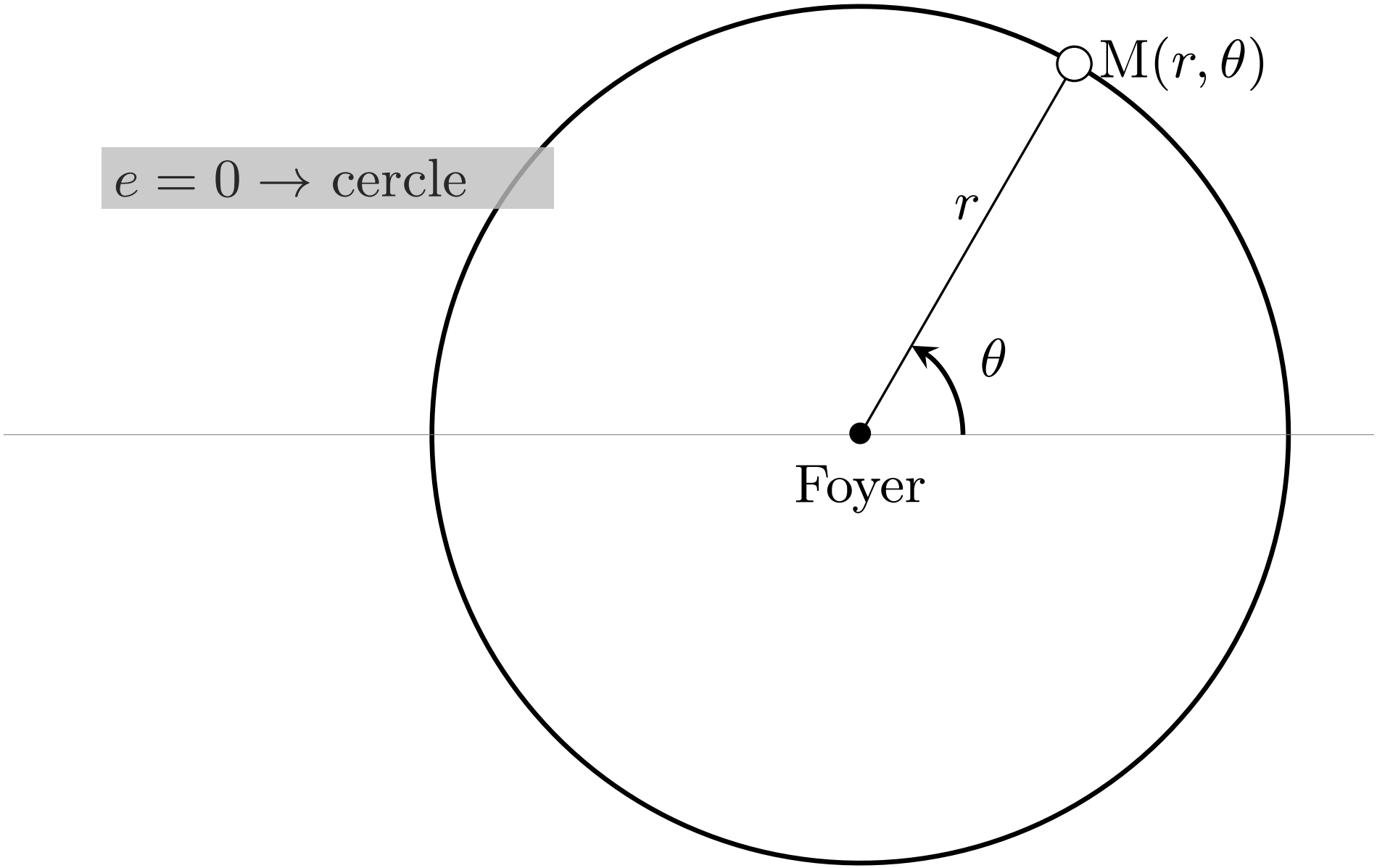


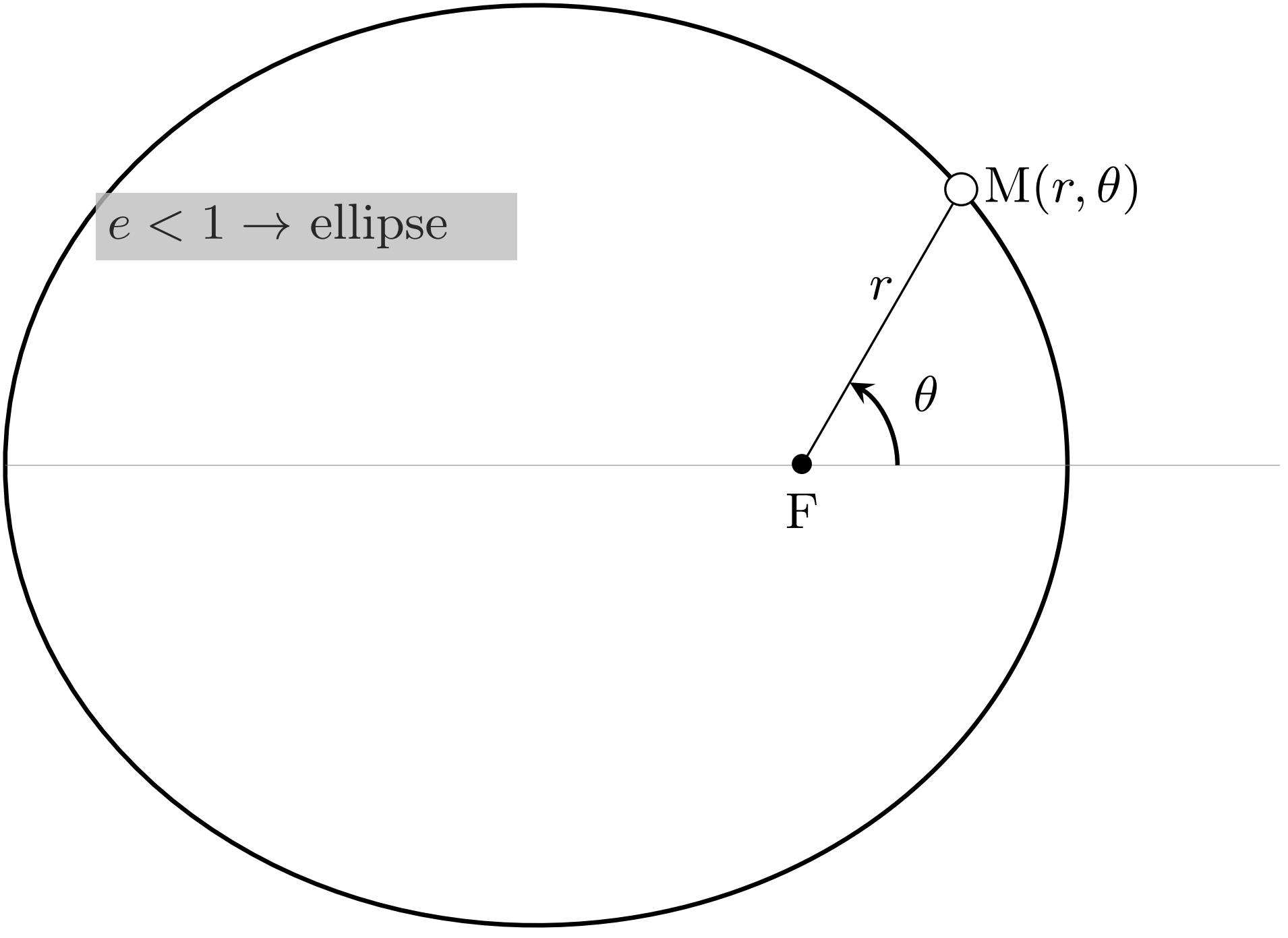
$$\vec{f}_{12} = -\mathcal{G}\frac{m_1 m_2}{r^2}\vec{u}_{12} \quad \text{avec} \quad \mathcal{G} = 6{,}67 \cdot 10^{-11} \text{ SI}$$

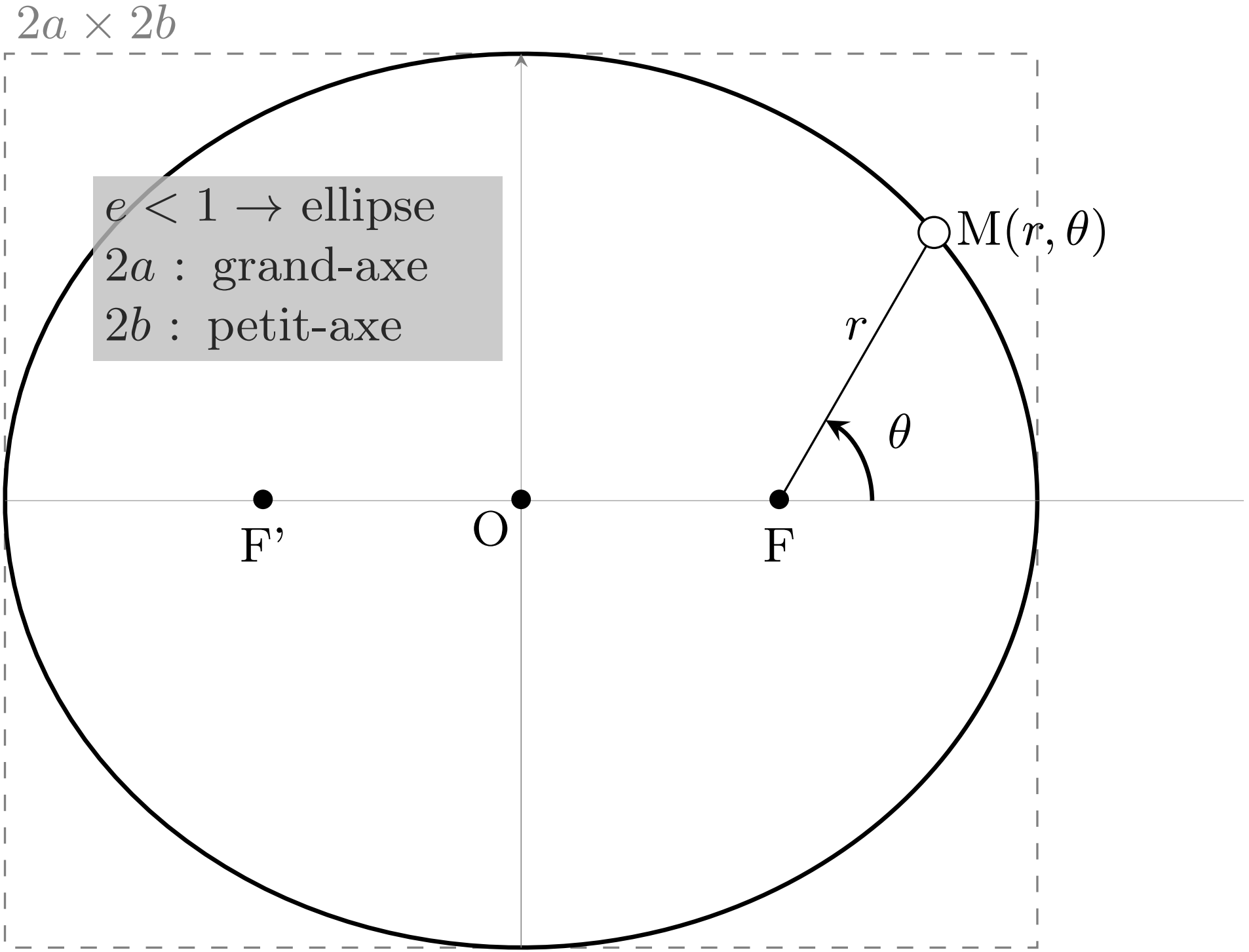


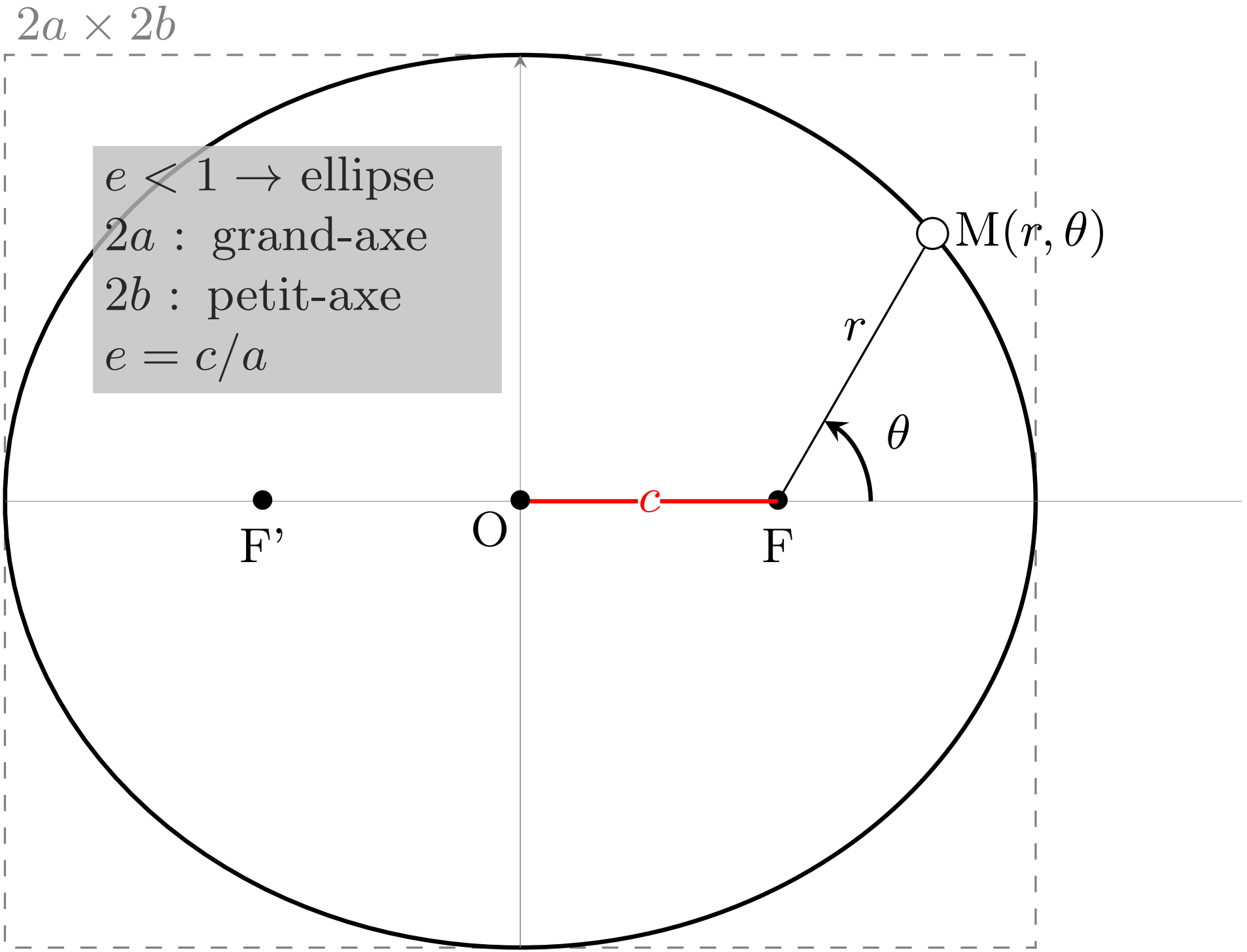
P : planète de masse m

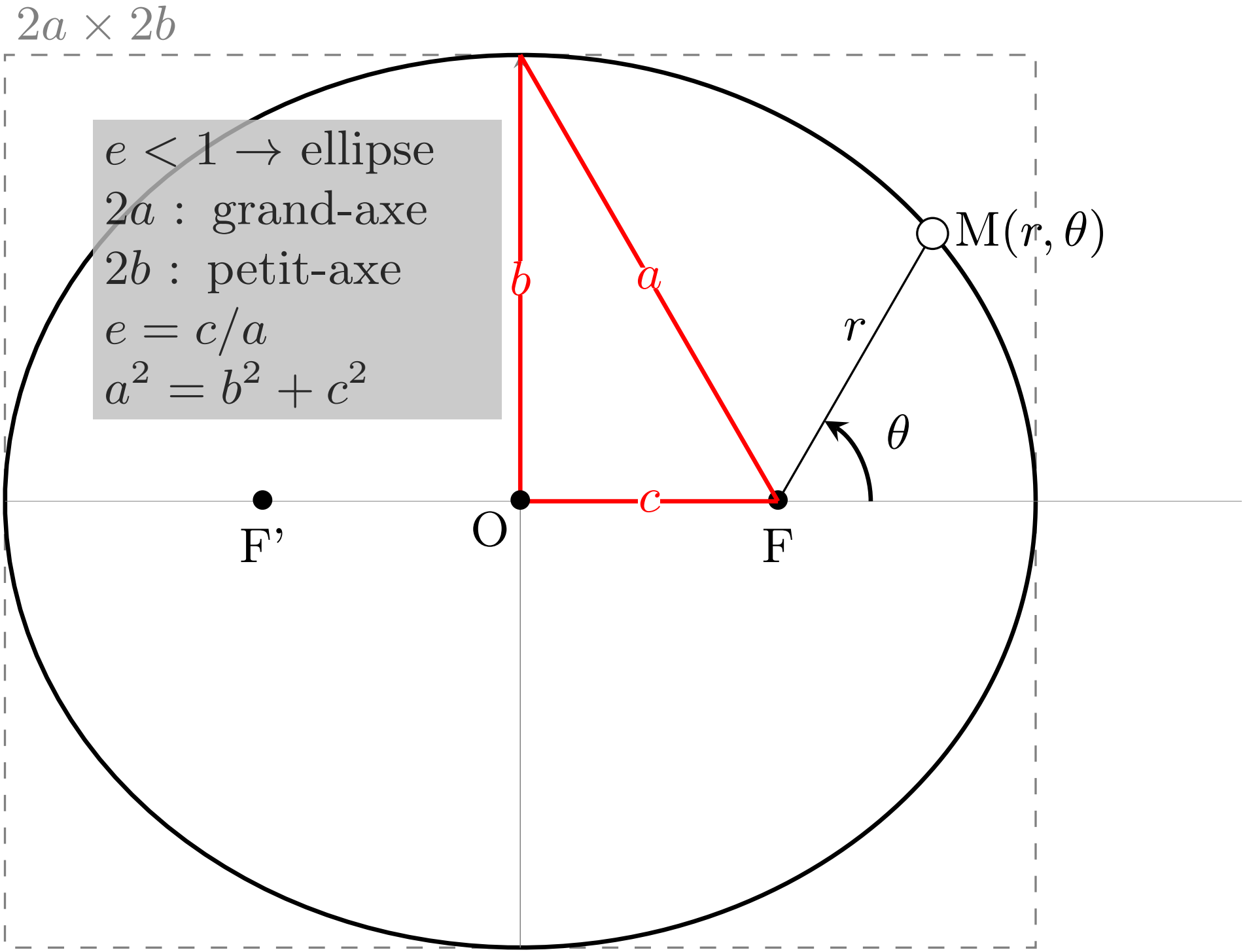
E : étoile de masse $m^\star$

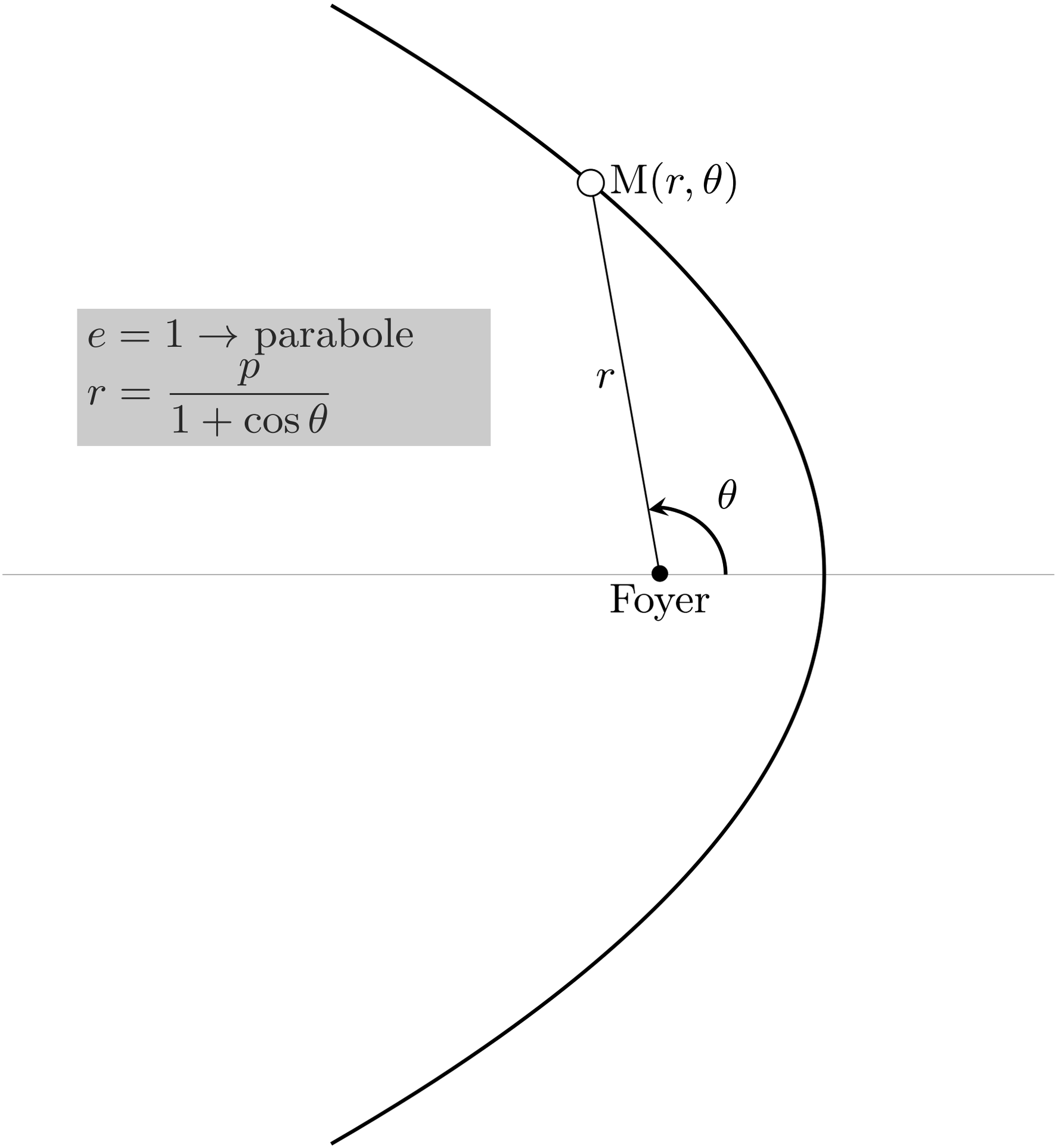

$e = 0 \rightarrow$ cercle
M(r, θ)
r
θ
Foyer

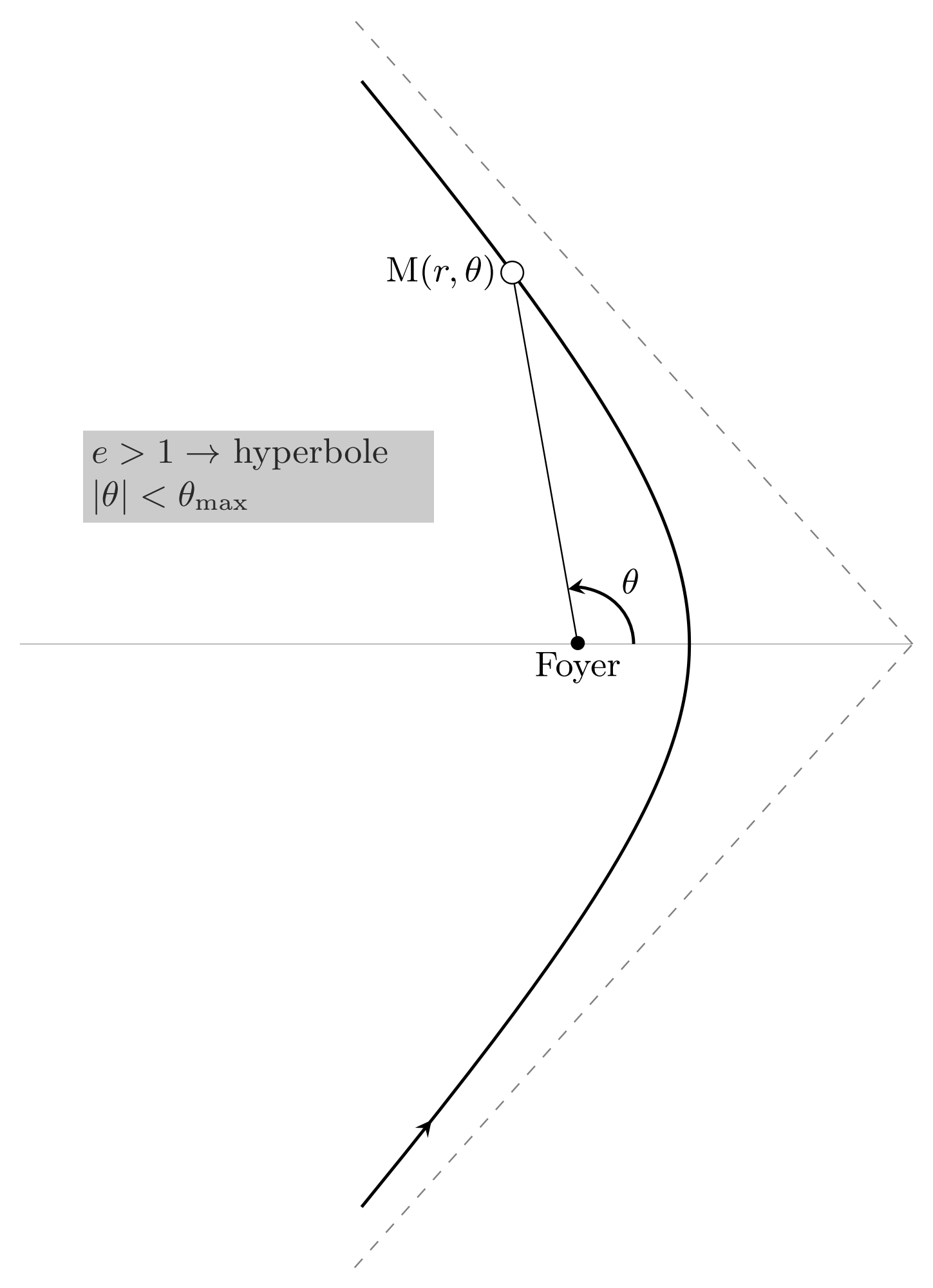

$e < 1 \rightarrow$ ellipse
M(r, θ)
r
θ
F


$2a \times 2b$
$e < 1 \rightarrow$ ellipse
$2a$: grand-axe
$2b$: petit-axe
M(r, θ)
r
θ
F'
O
F

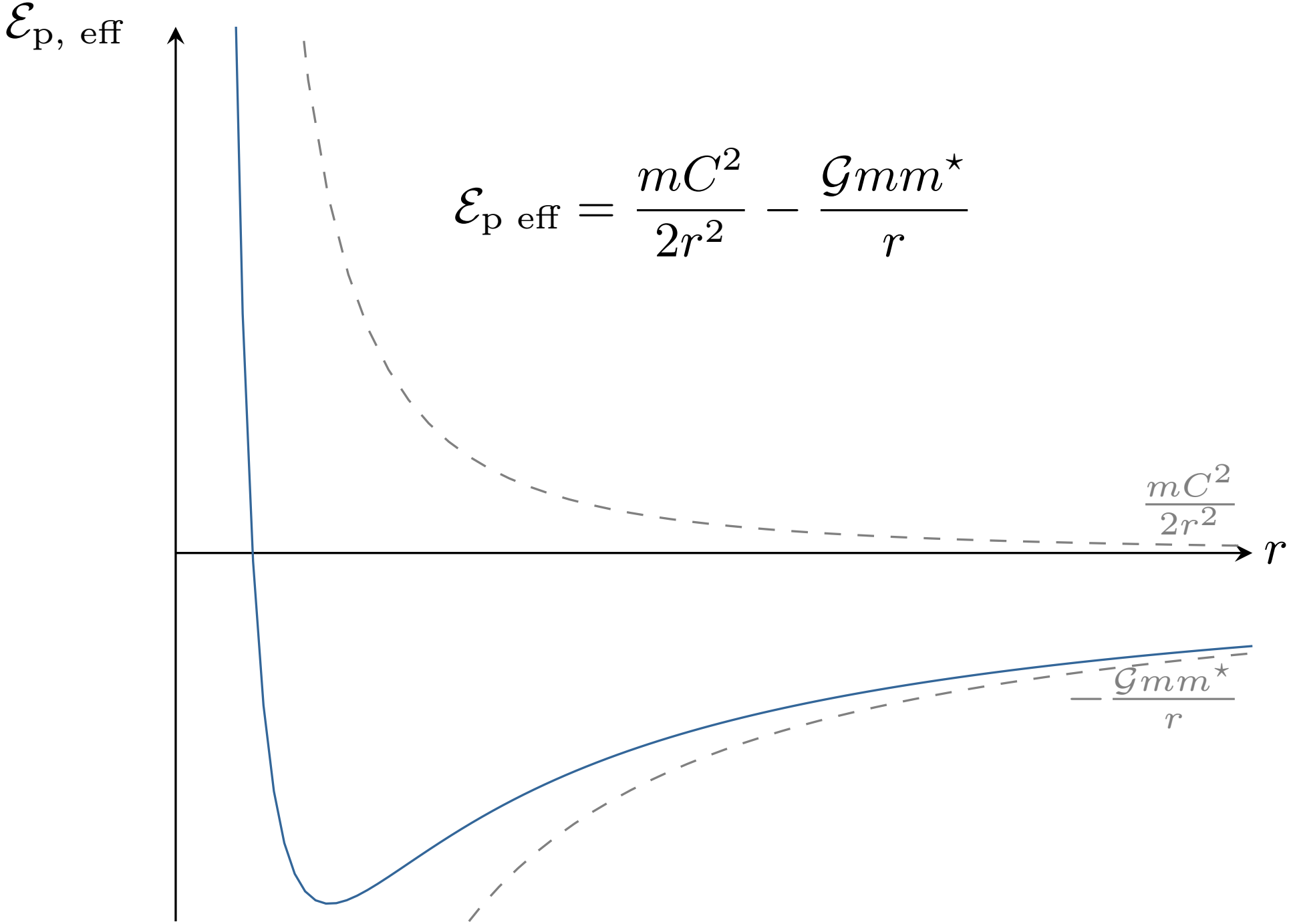

$2a \times 2b$
$e < 1 \rightarrow$ ellipse
$2a$: grand-axe
$2b$: petit-axe
$e = c/a$
M(r, θ)
r
θ
F'
O
c
F

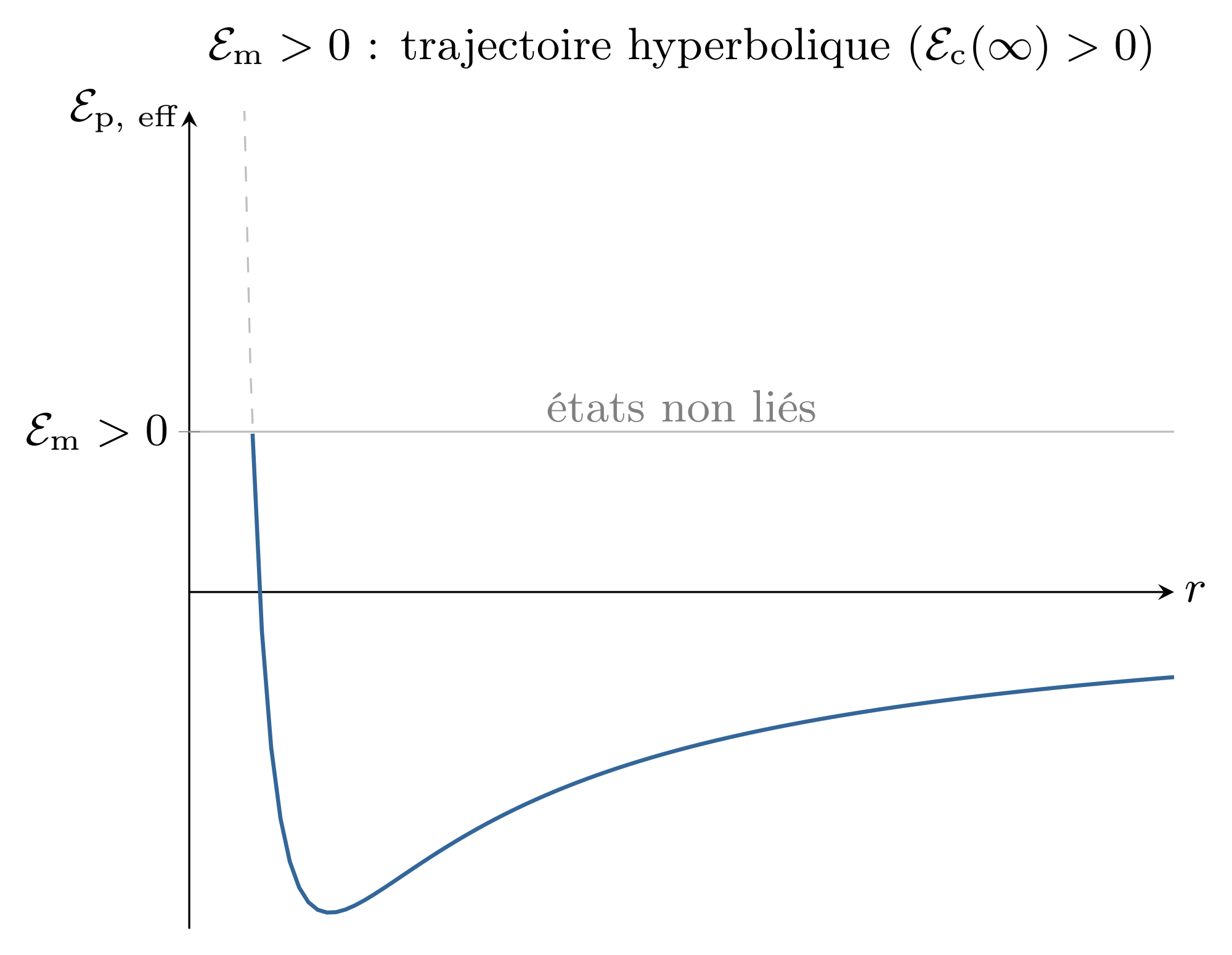

$2a \times 2b$
$e < 1 \rightarrow$ ellipse
$2a$: grand-axe
$2b$: petit-axe
$e = c/a$
$a^2 = b^2 + c^2$
b
a
r
θ
c
M(r, θ)
F'
O
F

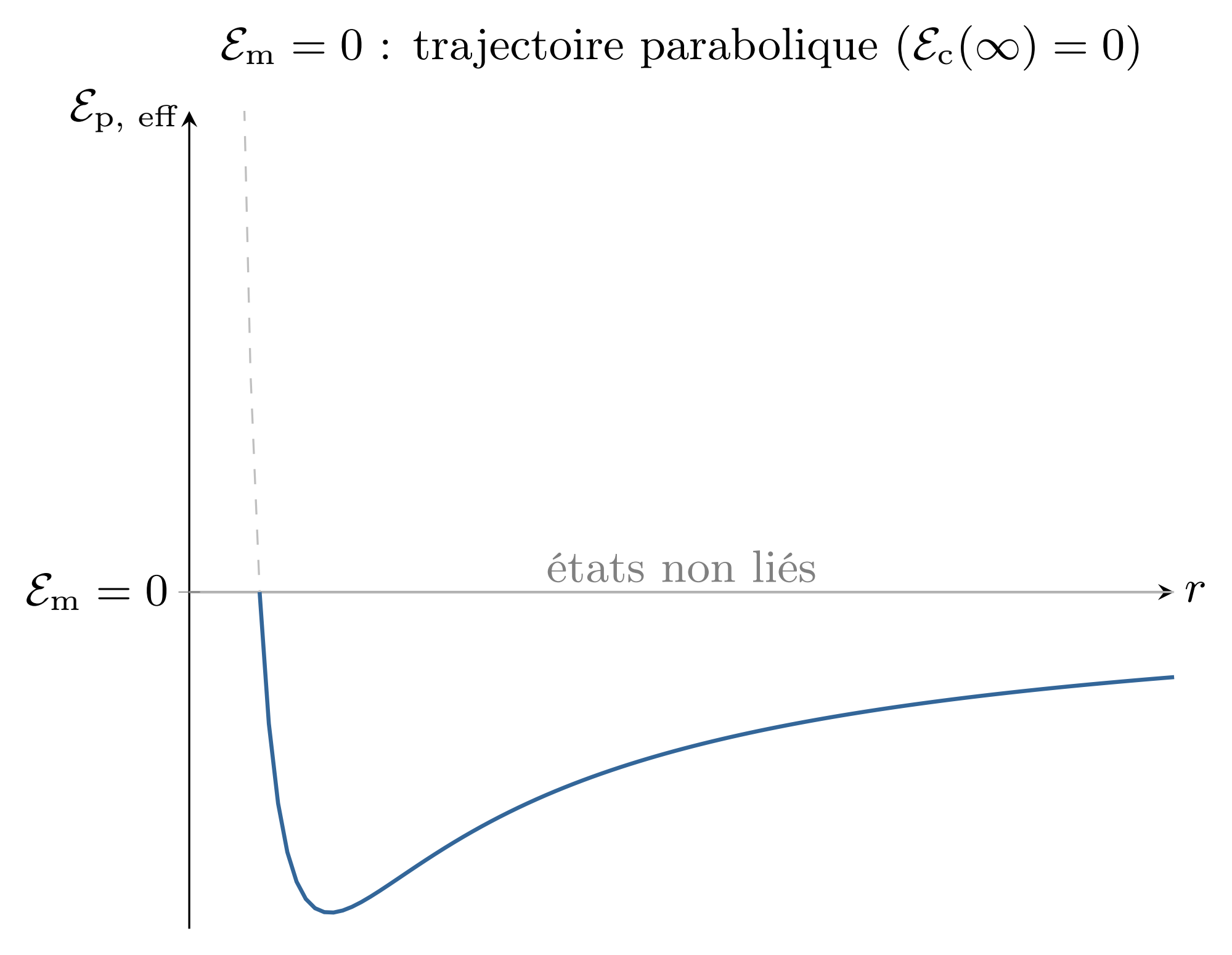

$e = 1 \rightarrow$ parabole
$r = \dfrac{p}{1 + \cos\theta}$
M(r, θ)
r
θ
Foyer

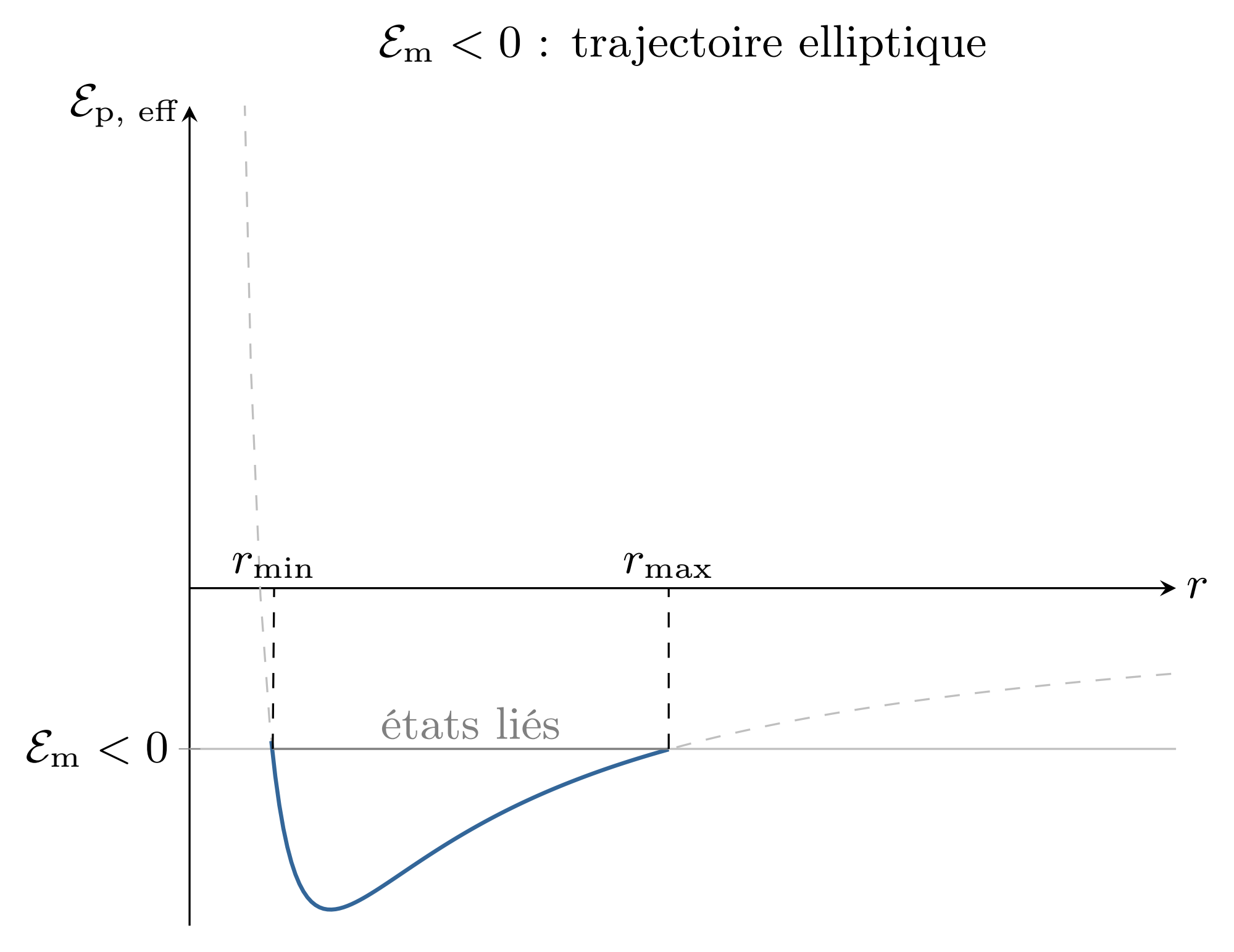

M(r, θ)
$e > 1 \rightarrow$ hyperbole
$|\theta| < \theta_{\max}$
θ
Foyer

$\mathcal{E}_{\text{p eff}}$ en fonction de r

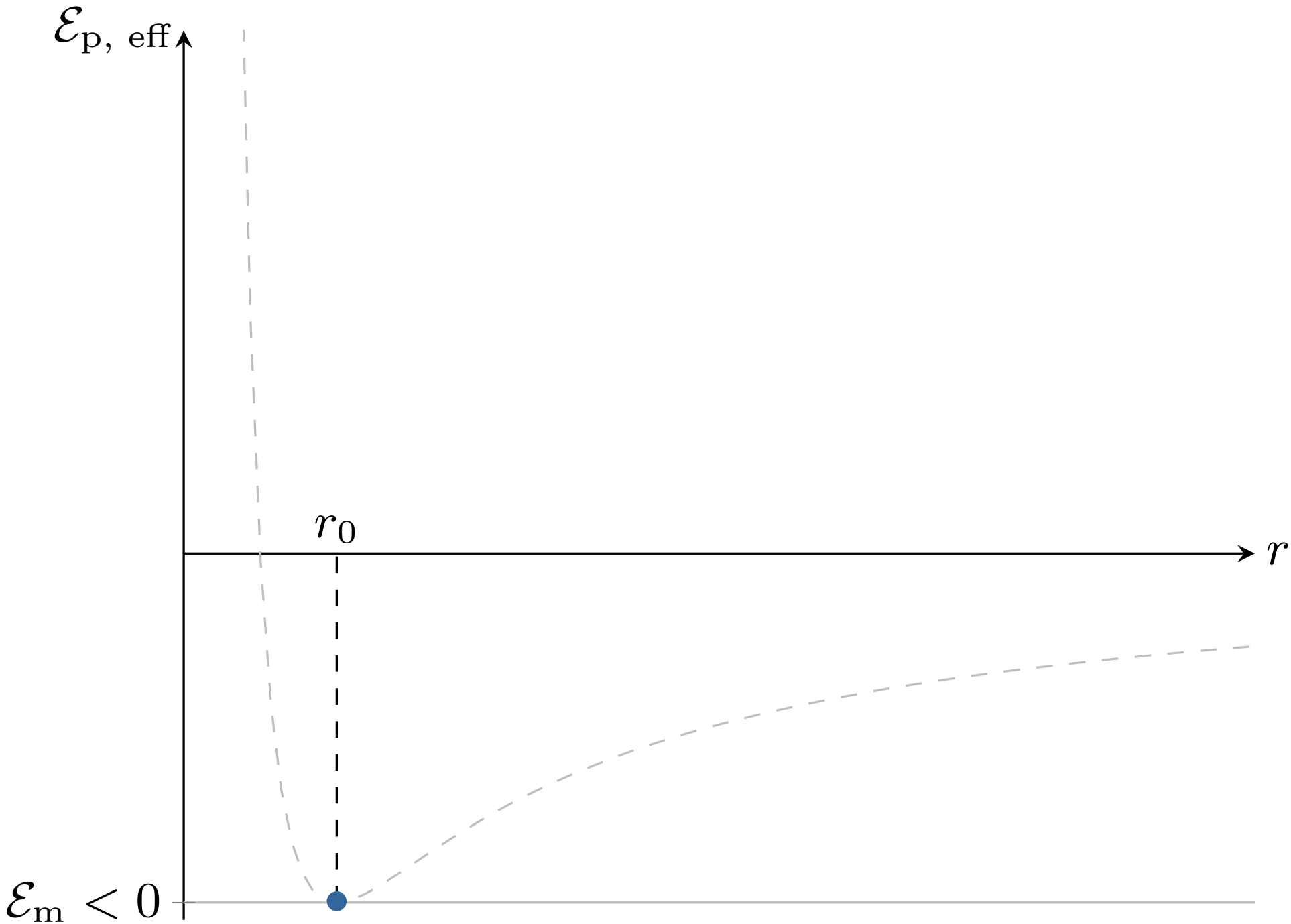


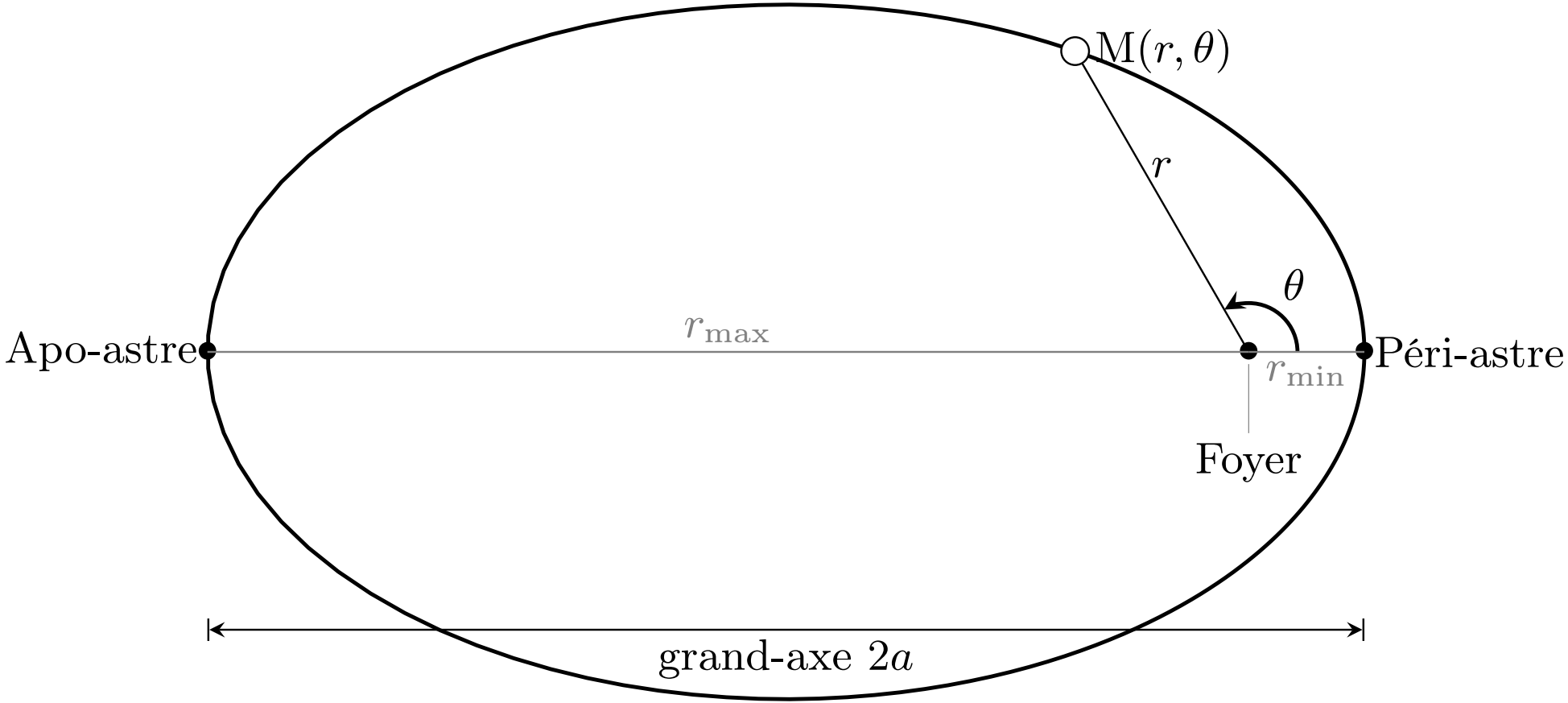

$\mathcal{E}_\mathrm{m} > 0$: trajectoire hyperbolique ($\mathcal{E}_\mathrm{c}(\infty) > 0$)
$\mathcal{E}_\mathrm{p,\ eff}$
états non liés
$\mathcal{E}_\mathrm{m} > 0$
r

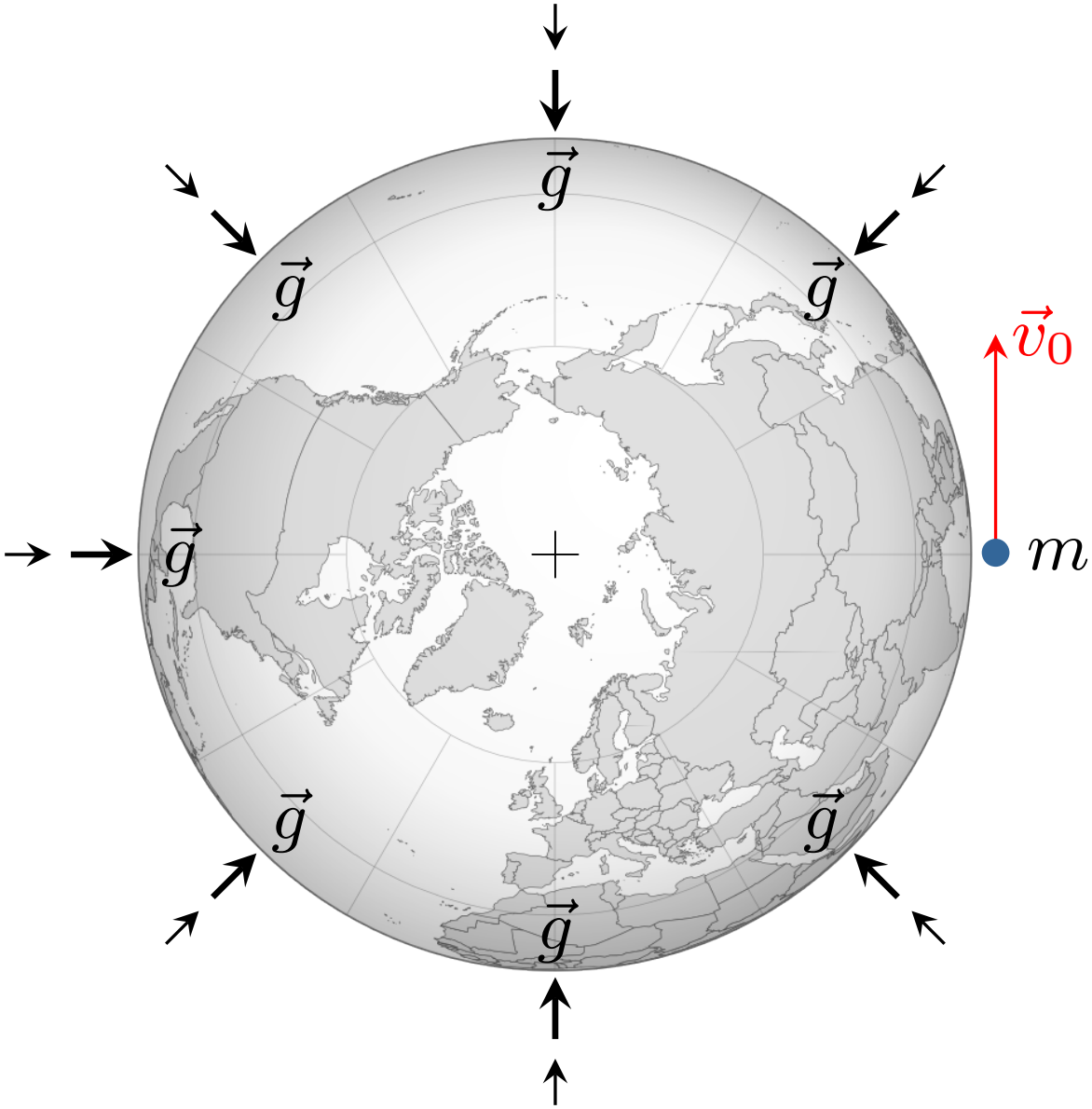

$\mathcal{E}_\mathrm{m} = 0$: trajectoire parabolique ($\mathcal{E}_\mathrm{c}(\infty) = 0$)
$\mathcal{E}_\mathrm{p,\ eff}$
$\mathcal{E}_\mathrm{m} = 0$
états non liés
r

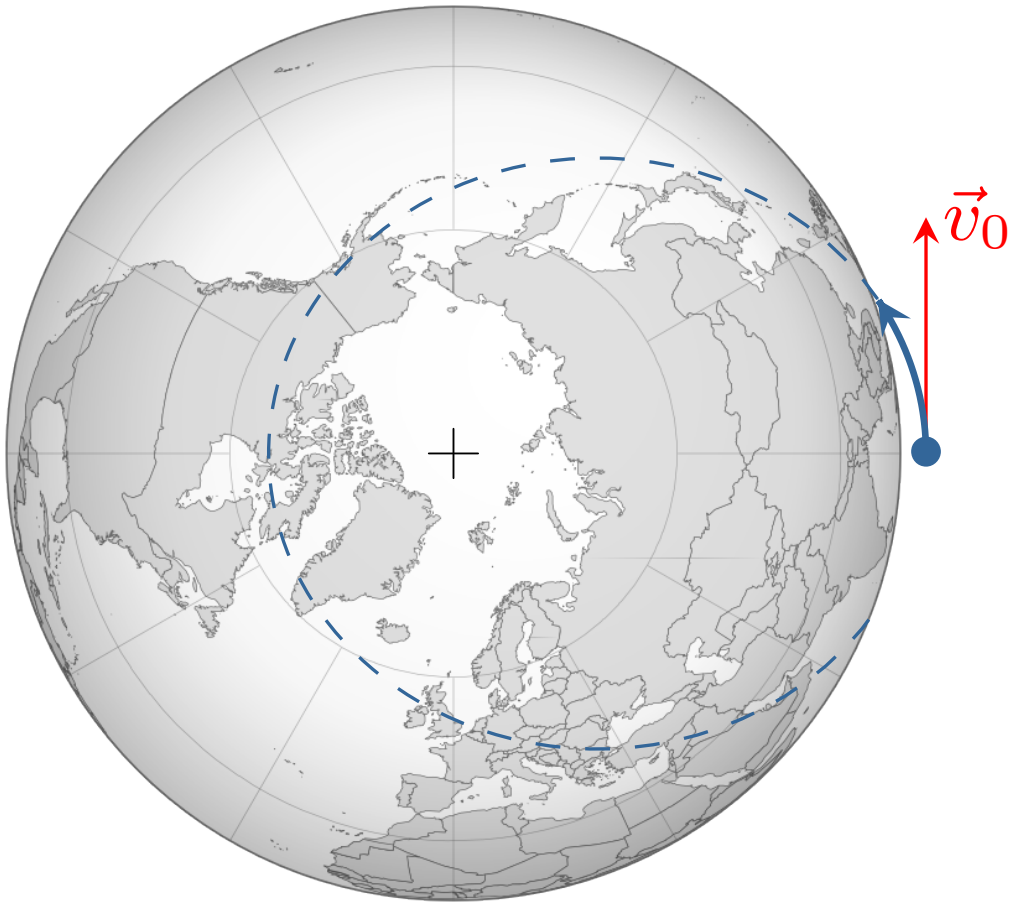

$\mathcal{E}_{\mathrm{m}} < 0$: trajectoire elliptique
$\mathcal{E}_{\mathrm{p,\ eff}}$
r_{min}
r_{max}
r
états liés
$\mathcal{E}_{\mathrm{m}} < 0$

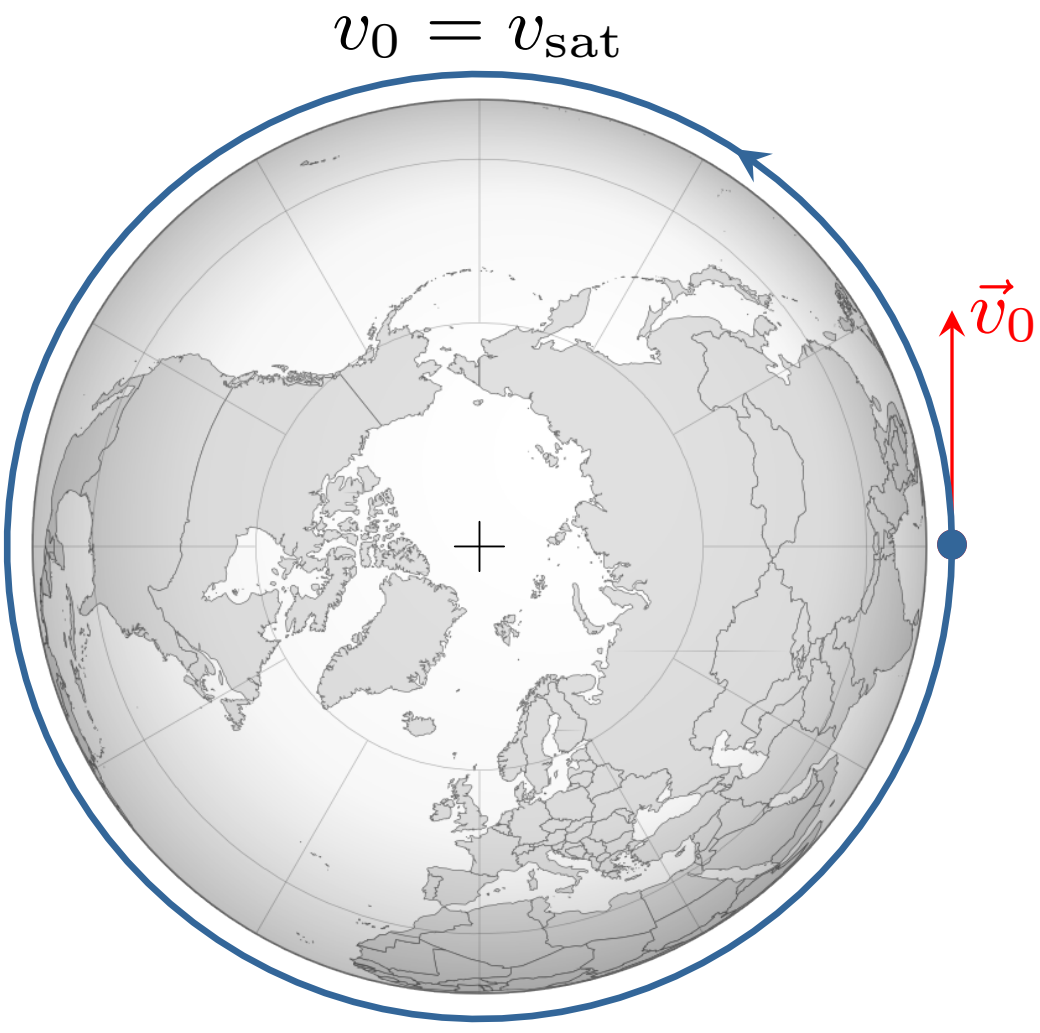
Cas particulier : trajectoire circulaire

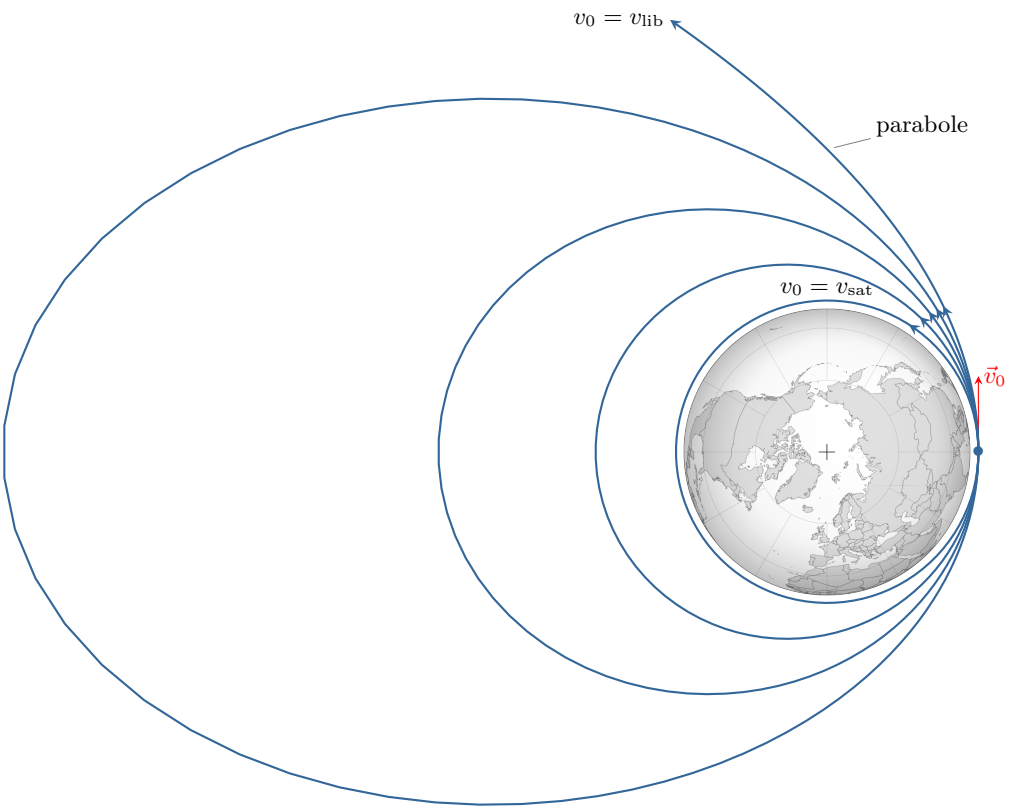


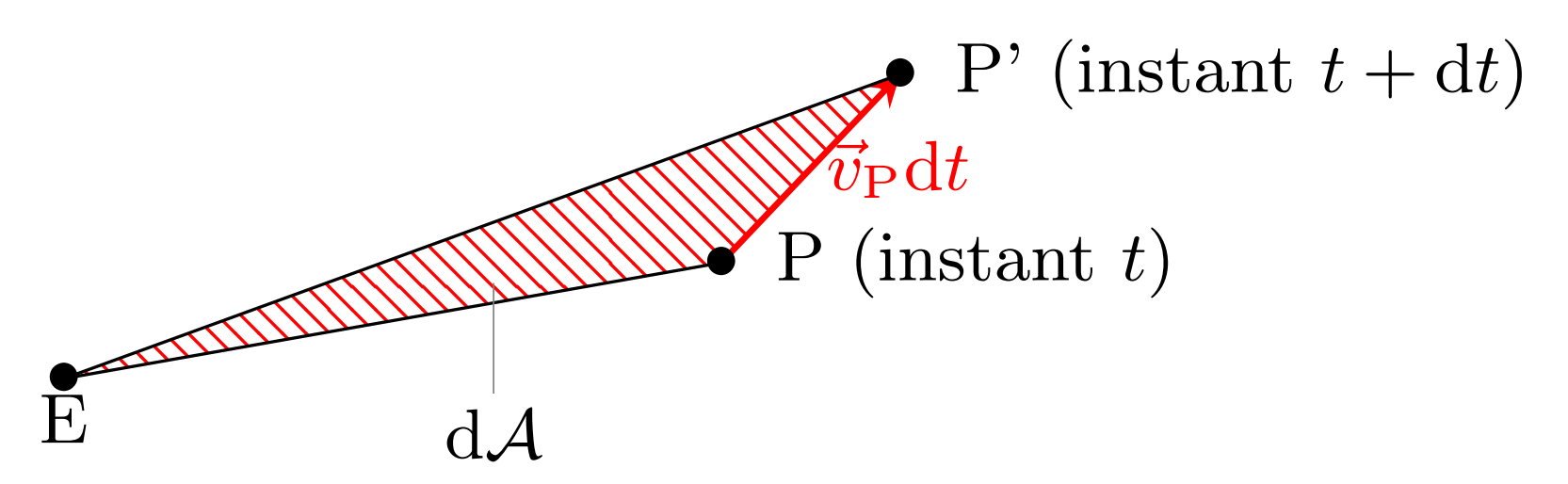

M(r, θ)
r
θ
Apo-astre
r_max
Péri-astre
r_min
Foyer
grand-axe 2a

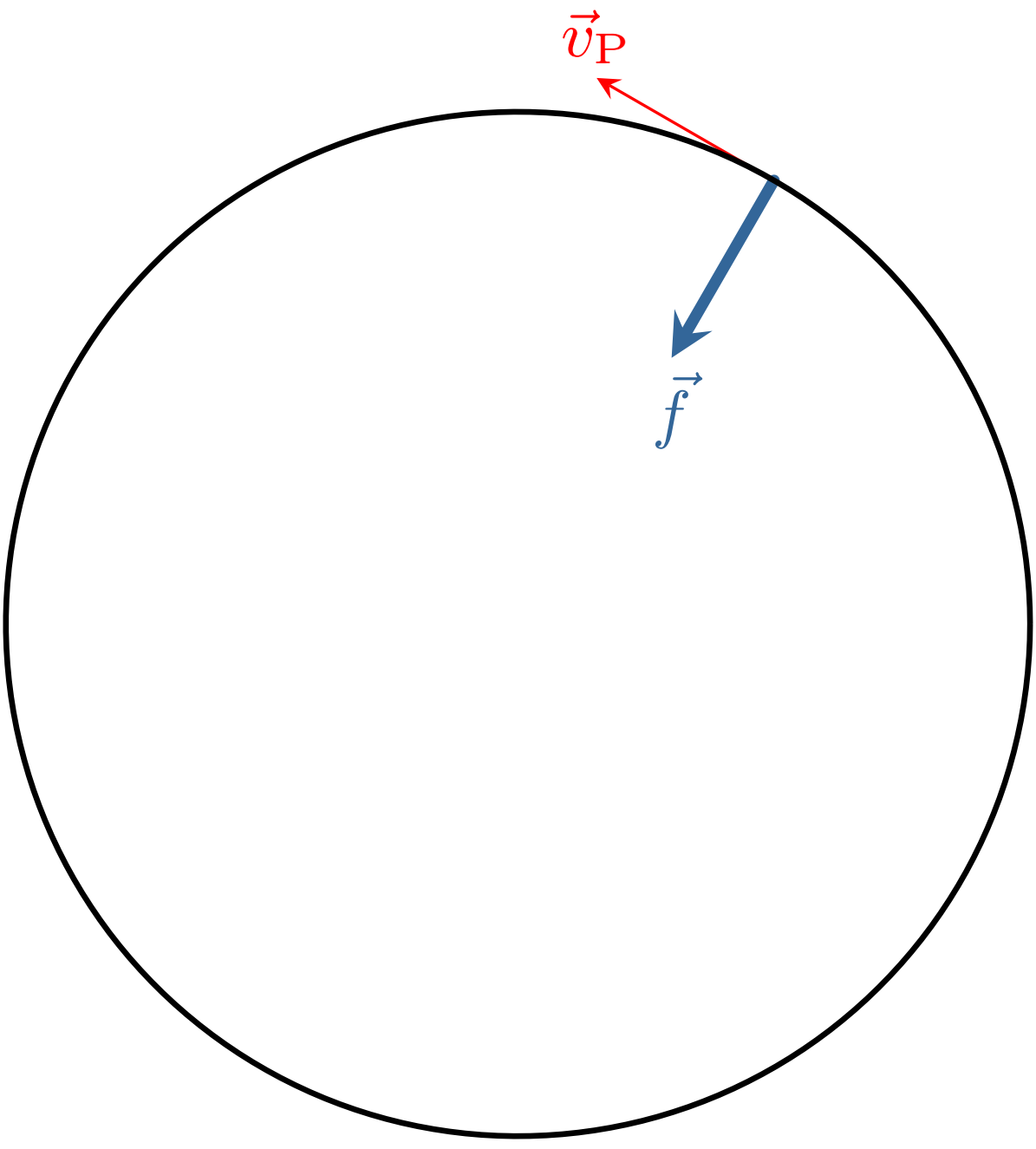

$\vec{g}$
$\vec{g}$
$\vec{g}$
$\vec{g}$
$\vec{g}$
$\vec{g}$
$\vec{g}$
$\vec{v}_0$
m


$\vec{v}_0$


$v_0 = v_{\mathrm{sat}}$
$\vec{v}_0$


$v_0 = v_{\text{lib}}$
parabole
$v_0 = v_{\text{sat}}$
$\vec{v}_0$


P' (instant $t + \mathrm{d}t$)
$\vec{v}_{\mathrm{P}}\,\mathrm{d}t$
P (instant t)
E
$\mathrm{d}\mathcal{A}$


$\vec{v}_{\mathrm{P}}$
$\vec{f}$