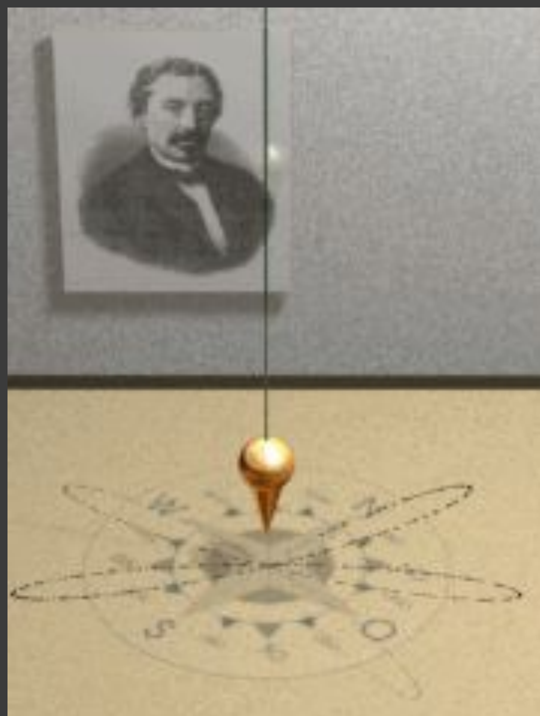
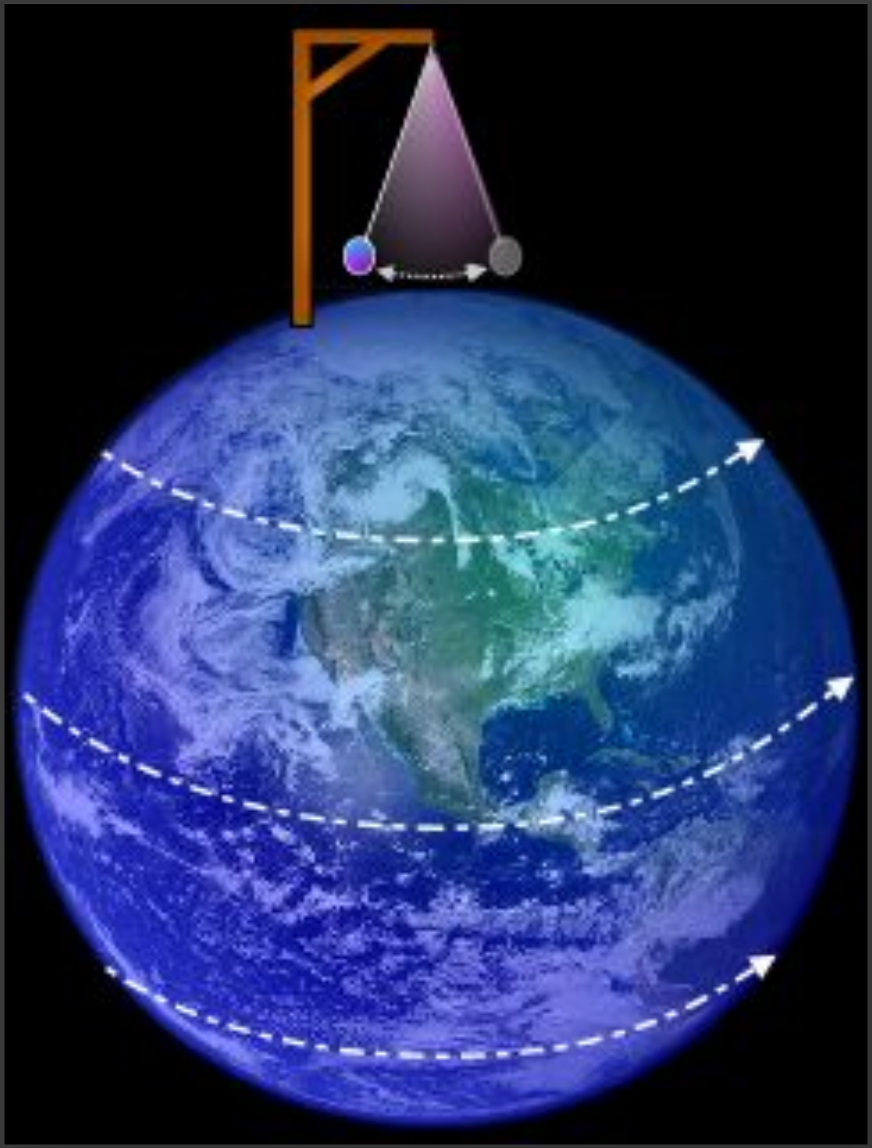
FOUCAULT PENDULUM

Presentation

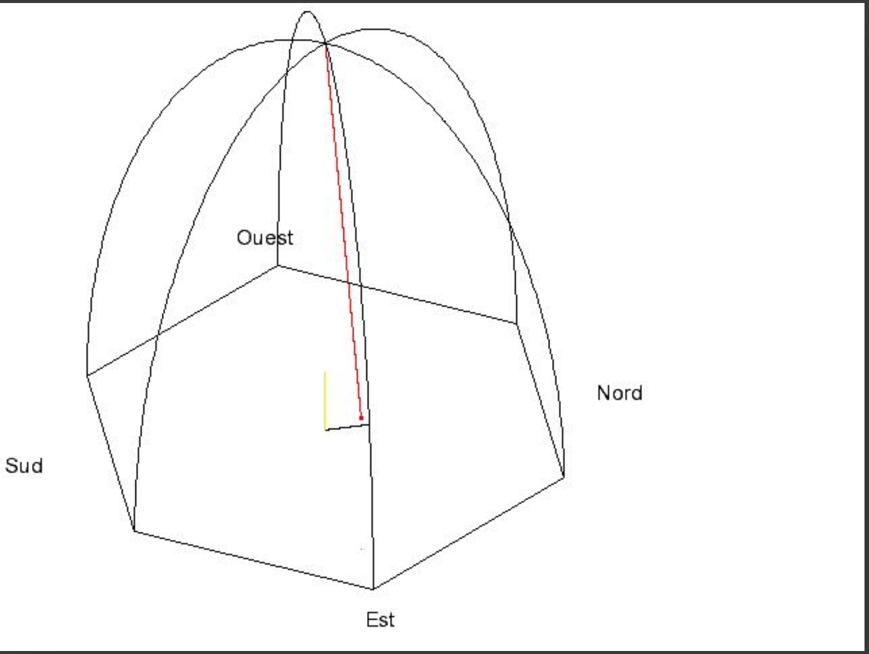


The **Foucault pendulum** (pronounced /fuːˈkoʊ/ "foo-koh"), or **Foucault's pendulum**, named after the French physicist Léon Foucault, was conceived as an experiment to demonstrate the rotation of the Earth

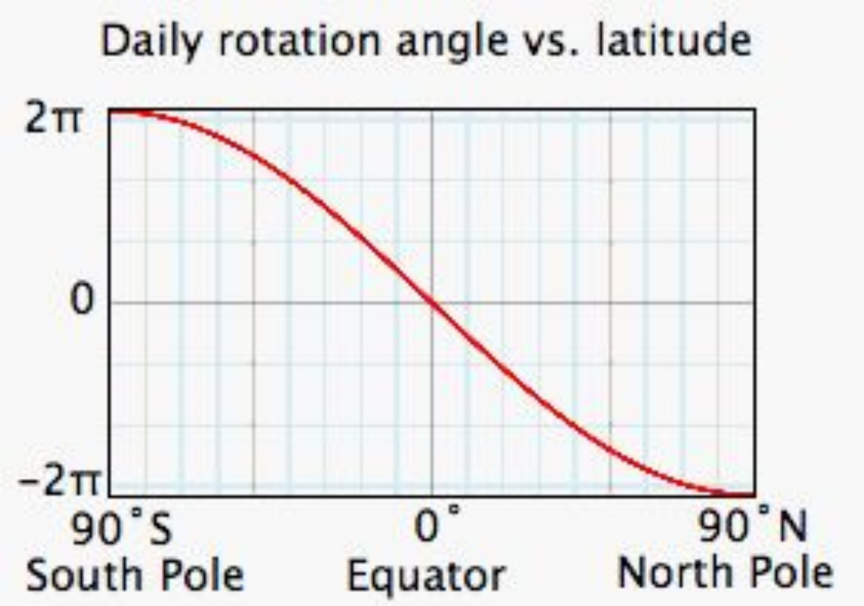
Foucault's Pendulum
in the Panthéon, Paris



A Foucault pendulum at the north pole. The pendulum swings in the same plane as the Earth rotates beneath it.



Animation of a Foucault pendulum at the Pantheon in Paris (48° 52' North), with the earth's rotation rate greatly exaggerated. The green trace shows the path of the pendulum bob over the ground (a rotating reference frame), while the blue trace shows the path in a frame of reference rotating with the plane of the pendulum.



$$\alpha = 360 \sin(\phi).$$

$$F_{c,x} = 2m\Omega \frac{dy}{dt} \sin(\phi)$$

$$F_{c,y} = -2m\Omega \frac{dx}{dt} \sin(\phi)$$

$$F_{g,x} = -m\omega^2 x$$

$$F_{g,y} = -m\omega^2 y.$$

$$\frac{d^2x}{dt^2} = -\omega^2 x + 2\Omega \frac{dy}{dt} \sin(\phi)$$

$$\frac{d^2y}{dt^2} = -\omega^2 y - 2\Omega \frac{dx}{dt} \sin(\phi).$$

$$\frac{d^2z}{dt^2} + 2i\Omega \frac{dz}{dt} \sin(\phi) + \omega^2 z = 0.$$

$$z = e^{-i\Omega \sin(\phi) t} \left(c_1 e^{i\omega t} + c_2 e^{-i\omega t} \right).$$

If we measure time in days, then $\Omega = 2\pi$ and we see that the pendulum rotates by an angle of $-2\pi \sin(\phi)$ during one day.