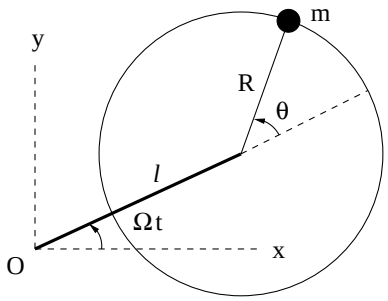
## [mex25] Pendulum without gravity

A bead of mass $m$ is free to slide along a circular wire of radius $R$ in a horizontal plane. The wire is forced to rotate with constant angular velocity $\Omega$ about a vertical axis at $O$, separated a distance $\ell$ from the axis of the circle. Determine the Lagrangian $L(\theta, \dot{\theta})$ of this dynamical system. Show that the Lagrange equation for $\theta$ describes the motion of a plane pendulum with angular frequency that depends on $\ell, R, \Omega$.




**Solution:**