Figure 1

The exes ξ and η belong to the plane of the disk (gyro). The axis ξ is horizontal. The table rotates about the axis z. In the frame $S\xi\eta\zeta$ the inertia tensor of the disk is as follows $J_S = \mathrm{diag}(A, A, B)$; here S is disk's center of mass.

The Lagrangian is

$$L = \frac{A}{2}\left(\dot{\theta}^2 + \Omega^2 \sin^2\theta\right) + \frac{B}{2}\left(\Omega\cos\theta + \dot{\varphi}\right)^2;$$

$$\frac{\partial L}{\partial \dot{\varphi}} = B(\Omega\cos\theta + \dot{\varphi}) = c.$$

The effective potential is

$$V_c = -\frac{1}{2}A\Omega^2\sin^2\theta - c\Omega\cos\theta.$$