[mex275] T-bar pendulum

This T-bar pendulum consists of two thin rods, each of length l and mass m, mounted as shown. It is free to swing in the plane of the paper about the pivot.

(a) Find the distance $r_{\rm cm}$ of the center of mass from the pivot.

(b) Find the moment of inertia $I_{\rm T}$ of the T-bar for rotations about the pivot.

(c) Find the Lagrangian $L(\phi, \dot{\phi})$ and derive the Lagrange equation from it, where ϕ is the angular deviations from the equilibrium orientation shown.

(d) Find the impulse Fdt to be imparted by a horizontal kick at the position indicated such that it produces an oscillation with maximum angle $\pi/2$.



Solution: