Regis University – Physics 305A – Fall 2017
Lab 10: Friction in Circular Motion

This lab may feel like a "mash-up" of several others that you have done recently – it involves a combination of friction, circular motion, and coins.

You will place a penny on the aluminum plate whose moment of inertia you once measured, and you will allow it to spin faster and faster on the rotational motion sensor until the penny flies off. You should choose a position for the penny, measure the radial position of the penny from its center, then let it fly. You can stop the rotation with your hand at that instant. Just at the moment when the penny starts to move:

- What is the angular speed of the penny?
- What is the linear speed of the penny?
- What is the radial (centripetal) component of the penny's acceleration?
- What is the azimuthal (tangential) component of the penny's acceleration?
- What is the magnitude of the penny's acceleration? Did one component end up almost completely dominant over the other?
- What is the coefficient of static friction μ_s between the penny and the aluminum plate?

Record enough data to be able to reliably estimate the uncertainty of your measurement of μ_s, starting the penny from the same radial position each time.

Finally: choose a very different radial position for the penny, and make a prediction of the angular speed at which the penny will start to move from there, assuming that μ_s remains the same. Then, after you have made your prediction, do the experiment, and compare.