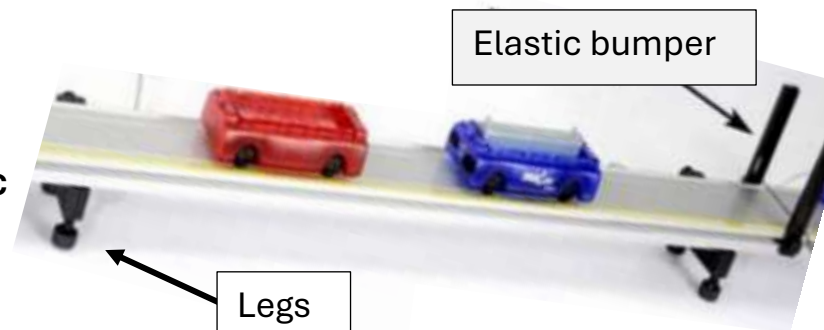




## Manual to Lab 3: PHY2048C

Florida State University

### 1D-Collisions



#### About labs in this class

The labs in this class will have general instructions, and many things need to be figured out by the students. **Answer the questions and record your measurements in your lab notebook and then submit the notebook at the end of the activity.**

#### About this lab

In this lab, you will measure the coefficient of restitution of a partially inelastic collision. You are provided with all the tools required to make this measurement. You will need the camera of your phone and/or the app *phyphox*.

**Activity 1.** Set up the collision experiment. Make sure it is perfectly leveled. Perform one perfectly elastic collision experiment with two equal masses. Describe what you see in your notebook. (Hint: the elastic bumpers will make your life easier. Use the legs to level the setup).

**Question 1.** Is this behavior consistent with the equations of conservation of momentum and conservation of energy? Use the equations to prove this.

**Activity 2.** Come up with a way to use your phone to measure the speed of the cars before and after the impact *by taking a video or using phyphox*.

**Activity 3.** Perform a totally inelastic collision by colliding the sides of the cars that have Velcro patches.

**Question 2.** Get a percentage discrepancy between prediction and observation for the velocity after the collision.

**Activity 3.** Slightly pull out the plastic stub in the middle of the Velcro patches in both cars. Make them collide by having these stubs collide. This is a partially inelastic collision. Measure the coefficient of restitution of the collision, given

by  $\epsilon = \sqrt{\frac{KE_f}{KE_i}}$ , Make multiple measurements and a histogram (use other group's values as well) and report the average  $\epsilon$  value with a 10% error.