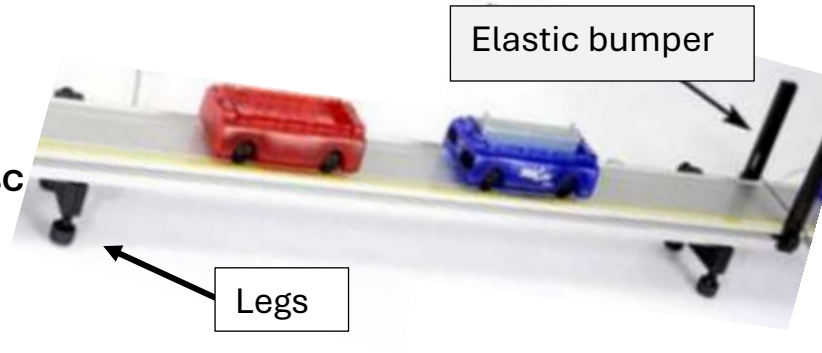
Manual to Lab 3b: PHY2048C

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 ϵ value with a 10% error.