Designing and Building an Electromagnetic Mass Accelerator

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Overview

An electromagnetic mass accelerator uses electric currents to accelerate a projectile to very high speeds. When a current is passed through two rails connected by a sliding, conductive armature, an electromagnetic force is generated which expels the armature from the rails – a phenomenon known as the Lorentz force. This project designed the circuitry and physical assembly for a mass accelerator to be installed in the UAH Physics Department Physics II laboratory.

Impact

The eventual construction of a mass accelerator using these designs will provide students taking Physics II the opportunity to see a powerful demonstration of the physical laws they are studying. The mass accelerator will also serve as a platform for a multidisciplinary array of senior design projects, honors capstone projects, and graduate research.

Designs and Results

The energy storage capacitor bank, charging circuitry, control circuitry, and rail assembly were all successfully designed, and components for prototyping the electronics were purchased. Prototyping and final construction for electronic and mechanical components will continue into the 2018-2019 academic year until project completion.

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