



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Marsh W. White Award Proposal

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<b>Project Proposal Title</b>	How can physics power your life?
<b>Name of School</b>	University of the Sciences
<b>SPS Chapter Number</b>	5619
<b>Total Amount Requested</b>	\$500

### Abstract

The SPS chapter at University of the Sciences plans to participate in The Philadelphia Science Festival as an exhibitor at the science carnival. As exhibitors, we will engage community members of all ages in understanding physics concepts of electricity and magnetism in an interactive and hands on manner.

# Proposal Statement

## **Overview of Proposed Project/Activity/Event**

The Philadelphia Science Festival is an annual nine-day, community-wide event that aims to engage the city into understanding and appreciating science through lectures, debates, hands-on activities, special exhibitions, and more. Over 120,000 community members participate in the festival. Our plan is to be an exhibitor at their science carnival event. During the carnival, many participants will be wandering around and exploring a variety of different sciences. Traditionally, there is a slight stigma when it comes to understanding physics and it is usually thought of to be out of reach for the general public. Our goal in participating in this event is to help people of all ages gain a better understanding of electricity and magnetism and ideas that fall under this broad topic, including motors, electromagnets, and electromagnetic induction. An interactive environment will be created in which we will introduce each demonstration to the public, ask for their prediction of how it works, then demonstrate and explain the physics behind each process. There will be opportunities for the public to experiment with the demos themselves to gain a greater understanding. This will be our chapter's fifth year hosting a table at the festival and it is our goal to continue the tradition in order to be a part of our community and help to promote physics throughout our city of Philadelphia.

## **How Proposed Activity Promotes Interest in Physics**

We will highlight the physics underlying various concepts and applications of electricity and magnetism, and attempt to cast light on concepts such as magnetic fields, electricity, AC/DC motors, power generation, etc. Our goal is to take a more holistic and everyday approach in explaining concepts in the field of electricity and magnetism through fun and interactive demonstrations. The advantage of incorporating ideas from E&M lies in the fact that a big majority of our booth visitors during the past few Science Carnivals have been young children that have not yet been exposed to any physics or mathematics courses. Since the demonstrations explaining ideas in E&M are rather down-to-Earth, and easily observable, compared to other areas of physics, we believe that it will not be hard to promote interest in our demos even among our youngest audience members. By showing how the principles of E&M are omnipresent and used in everyday life, we hope to convey another important message--namely that physics is everywhere around us and that our world is inevitably governed by phenomena that only physics can explain. Physics is no longer a thing just for a select group of people, it becomes attainable for everyone. We hope that we can instill a passion for physics by participating in the carnival.

## Plan for Carrying Out Proposed Project/Activity/Event

**Personnel:** The project leader for this event will be Gopal Goberdhan (chapter secretary). SPS chapter members will participate in the event, each helping to engage participants and help them understand the demonstrations. There will be three training sessions so that volunteers are well equipped to explain the demonstrations. The progress will be monitored throughout our SPS chapter meetings and our chapter advisor will be present to suggest any improvements.

**Marketing:** This event will be marketed through our student activities office, a campus wide email about the event, and “teaser ads” about the demos to be used via SPS Chapter Facebook, and the SPS Zone 3 Facebook. In addition, it will be marketed through internal SPS communications, including at meetings. The Philadelphia Science Festival has its own form of marketing and has always had a good turnout of community members.

**SPS Member Participation:** About 4-8 SPS members are expected to volunteer with execution of the event. Volunteers from the University of the Sciences will be asked to join us as well.

**Expertise:** Many experienced outreach members of SPS, specifically those who have attended the festival in the past will be there to aid in the execution of the event.

The list of demonstrations are as follows:

1. AC/DC Generator - Demonstrates how AC/DC Currents are generated in a motor
2. Magnetic Field Demonstration (Magnetic Field Cube and Neodymium magnet): demonstrates how a magnetic field would look in a three-dimensional space
3. Jacob’s Ladder- demonstrates how electrons jump back and forth between the two wires, creating plasma, due to the high electricity.
4. Magnetic Putty and Neodymium Magnet- the magnetic putty contains ferric oxide powder, which makes it ferromagnetic. The putty attracts and completely swallows a neodymium magnet, bringing it to the center, as the magnetic strength is strongest in the center.
5. Faraday Cage - a faraday cage is used to demonstrate how electromagnetic signals can be blocked due to the 0 internal electric field within hollow metal. They are used for shielding purposes.
6. Compass - the needle of a compass points towards the north pole of the earth, which is technically a magnetic south pole. A compass is a simple and familiar apparatus to demonstrate how magnets work and how they attract opposite poles (like charges).
7. Electromagnetic demonstration: this demonstration is used to show how electromagnets are stronger than their regular magnet counterparts, and how using principles from both electricity and magnetism creates more efficient devices.
8. Electrolysis fuel cell car - a fun toy car that is powered solely by a fuel cell (electrolysis). The splitting of water molecules into their constituents, H<sub>2</sub> and O<sub>2</sub> gas creates a voltage difference between electrodes. This voltage difference, when connected to a circuit, drives a current that is used to power the motor in the toy car.
9. Induction Demonstration: This is demonstrating the interaction between electricity and magnetism. This particular demonstration will show how changing magnetic flux in a coil of wire will induce a current in the wire.

## Project/Activity/Event Timeline

**January 31:** Register as an exhibitor for table in the Science Carnival

**March 4:** Order all needed items by this day.

**March 19:** Hold a training session to teach SPS members how to setup and properly use the demonstrations

**April 11:** Hold another training session for SPS members to practice demonstrations

**April 23:** Hold a final training session

**April 24:** Pack all the demonstrations so they are safe for travel

**April 25:** Attend Festival

## Activity Evaluation Plan

The primary mode of determining the success of the event will be the response we get from participants. We will encourage our participants to fill out an evaluation after they have seen the demonstrations. Questions such as "Which of the demos did you like best?" will be asked. The evaluation will assess their previous interest in physics, what they liked the most about our table, improvements we could make, and their interest in physics after they have seen different booths. We will also have our volunteers talk with participants about their interest in physics and keep a record of the responses. Lastly, we'll have a post-activity evaluation among SPS exhibitors to discuss the execution of the event.

## Budget Justification

The budget proposed will be used to fund the supplies needed for the demonstration. The demonstrations will provide a visual and hands on interaction with physics which is essential for making an impact on the participants that the carnival. All of the items on the budgets are for the demonstration. Other sources of money are going to come from the budget of our SPS chapter which was allotted for this outreach event. This money will be used for decoration for our tables, to print out a handout and evaluation for our table. Our chapter will look to our Student Government Association for the transportation funds for volunteers to get to the event via public transportation.