



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	Throwing You For a Loop
Name of School	University of the Sciences
SPS Chapter Number	5619
Total Amount Requested	\$499.84

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 at this event, we will engage community members of all ages in understanding physics concepts of mechanics 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 rotational mechanics and ideas that fall under this broad topic, including Newton's laws, conservation of energy, and angular momentum. 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 three dimensional rotational motion of objects, and attempt to cast light on concepts such as force, momentum, gravitational and mechanical energy, centripetal motion, etc. Our goal is to take a more holistic and everyday approach in explaining concepts in the field of rotational mechanical physics through fun and interactive demonstrations. The advantage of incorporating ideas from mechanics 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 mechanics 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 omnipresent gravitational potential energy is converted to mechanical and vice versa touches upon another important message we are trying to convey, and that is 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 president). 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 has 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. “Newton’s Cradle”: demonstrates conservation of momentum and energy using multiple swinging, aligned spheres. When a sphere on one end is lifted, a force is transmitted throughout all of the remaining stationary spheres to eventually lift the last sphere on the opposite end.
2. “Bicycle Wheel Gyroscope”: the angular momentum of the bicycle wheel allows it to act as a gyroscope. When the wheel is spinning and tilted, the orientation of the axis changes because the angular momentum rotates.
3. “Pail of Water”: a cup of water is placed in the center of a tray that is attached to a string at all four corners. SPS members will demonstrate that one can spin the tray in a circle over their heads, and the liquid in the cup will not fall out presenting Newton’s first law of motion.
4. “Ring and Discs Demonstration”: A ring and sphere of equal radius and mass are placed to roll down an incline. The audience will guess which object will reach the bottom of the incline first. The results will explain the concepts of inertia and potential kinetic energy.
5. “Loop-de-Loop Track”: A track that consists of a circular loop demonstrating how the conservation of energy begins as potential energy and is converted to kinetic energy. The audience will guess how high the ball needs to be placed on the track so that it goes fully around the loop.
6. “Coin and Feather falling in a vacuum”: Included in this kit are a coin, a feather, a guinea and feather tube, and end plugs. The audience will watch and compare the falling acceleration rate of a feather and coin in a vacuum. This demonstrates the concepts of free fall, acceleration, and air resistance.
7. “Sand Pendulum”: The pendulum can oscillate in many directions allowing for all ages to learn about harmonic motion.
8. “Da Vinci Clock”: This model obtains its powers from weights showing the concept of gravitational energy. This is also demonstrate how gravitational energy can be translated into mechanical energy allowing the clock to function.

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 25: Hold a final training session

April 26: Pack all the demonstrations so they are safe for travel

April 27: Attend Carnival

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 including the confetti which will be used in the pail of water demonstration to include a more visual appear for the children. 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. Finally the “Bicycle Wheel Gyroscope” demonstration is owned by our chapter already and will be used for this event.