



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	Crash Course in Fundamental Force
Name of School	University of Florida
SPS Chapter Number	8599
Total Amount Requested	\$490

Abstract

At the SPS chapter at the University of Florida, we believe having an educated student body and general public is one of the most important goals to strive for. We hope to achieve this goal by creating physical demonstrations and showing them to the public at our local science museum.

Proposal Statement

Overview of Proposed Project/Activity/Event

“Crash Course in Fundamental Force” will be a series of demonstrations covering many topics in physics. This will include magnetism, waves, sound, mechanics, etc. For example, we will be showing and explaining when you pass an aluminum plate between two poles of a strong magnet, why it feels like you are passing the plate through a viscous substance. The UF SPS chapter tries to get the community involved in not only physics but in other sciences as well. There has been positive impact of physics outreach from an event that was coordinated for International Day of Women and Girls in Science, where people from all around Gainesville came to an event where women in science were invited to talk about their fields and answer questions about them. During this week we presented already existing demos at a local park. But with a larger budget, we would be able to create a greater number of demos and demos which are more elaborate. This would greatly increase the public’s interaction and understanding of physics and science in general.

How Proposed Activity Promotes Interest in Physics

One of the main stigmas surrounding the field of physics is that it is only understood by elite geniuses. By creating educational and understandable physics demonstrations, we hope to diminish this stigma. For example, we could show them eddy currents, standing waves, and electromagnetism. This is all to show that physics is not just what is in popular culture (i.e. quantum physics, string theory) but that it applies to more of our lives than currently thought. If the public can understand the importance and practical use of the field of physics, then that is the best form of promotion.

Even if one person learns something new, then our project will have been a success. Physics is all about understanding the world in which we live, and regular means of education may not always be sufficient to achieve this goal. By each person learning something new about how the world works, then that has directly increased their appreciation for the field of physics.

Plan for Carrying Out Proposed Project/Activity/Event

Recently a new museum has opened up in Gainesville, the Cade Museum for Creativity and Invention. This museum would be an ideal place to perform our demonstrations on a regular basis, and they are very interested in working with us. We would have a large audience which is eager to learn. Since this would be run by the SPS chapter, the president would be in charge of making sure everything is planned so that everything runs smoothly and efficiently. There are eight SPS officers who would rotate managing the actual event. There will always be two officers present at the event. As for club members, there is a Facebook page and an e-mail list showing members that would be available for outreach. The members will be contacted 2-3 weeks in advance to ensure there are enough people to help out at the museum. The members will then be sorted into 3 categories: always available, occasionally available, and rarely available. By using this list, we will always be able to have people working the demos.

Majority of the SPS members are not only physics majors; they are double majors in fields such as astronomy, mathematics, chemistry, and even geology. Because of this, SPS can work with the respective clubs to do more than just physics and expand it to all different sciences. Besides doing different physics subjects on different weeks, mechanics one week, electricity another, having other clubs involved will generate interest simply by telling attendees that there will be other sciences attending. The SPS officers will inform the local schools in the area as well as post fliers up around campus letting students know what SPS is doing and why. From there, word of mouth is the next best thing to generate interest.

Most of the SPS officers have done events like this before, so they know how to conduct outreach events with success. Since the demos describe basic physical phenomena, the SPS members are adequate to describe what the demos demonstrate. SPS will also contact different professors asking if they would like to be a part of “Crash Course in Fundamental Force” and present a few demos. This is so that the event will also showcase research and why it is needed.

Project/Activity/Event Timeline

Since it is already late in the semester, SPS would like to begin “Crash Course in Fundamental Force” at the beginning of next semester on January 17th. Assuming the mechanics demos will be on the first week, those will be finished first. Ideally, all the demos need to be finished by January 5th. All the materials will be bought by December 8th. Between then and January 5th, SPS members will be constructing any demos. By December 6th, there will be a list of interested professors and the availability schedule of SPS members. On January 12th, SPS will hold a soft demonstration of the demos with members of SPS and other clubs who are interested.

Activity Evaluation Plan

The metrics which will be used to measure the success of “Crash Course in Fundamental Force” are how many people participated and mini-surveys. Every week the officers in charge at the Cade Museum will make a rough count of how many people showed interest and/or participated with the demos. Taking that into account with how busy the museum was that week and the demographics that week, we can establish a trend and see how much we are impacting the public. Another way to measure our impact is to give mini-surveys. This will be about 5 questions and will ask if they liked the demos, what they liked, what they disliked, anything they would like to see, and any criticisms they have. Since people usually do not like filling out surveys, we will offer a piece of candy as a trade-off. If that does not work, we can create an e-mail account for participants to send any thoughts and opinions.

We will also invite professors out to see how we present the topics that week. Outreach becomes ineffective if the audience cannot understand what we are saying. Having professors there will give us insight into key strategies for engaging the audience, and they can perceive the feelings of the audience since they will be on their side.

Budget Justification

- The nerf gun will be used to demonstrate projectile motion as well as air resistance.
- The Slinky will be used to demonstrate waves both longitudinal and transverse.
- The bike wheel will be used to show angular momentum and torque. We will also find a spinning platform to include in this demonstration.
- The vacuum bell jar will be used to show both demos about pressure, (putting a marshmello in the vacuum) and demos about sound (putting some sort of sound source inside and hearing that no sound is made).
- The magnetic field tube shows what magnetic fields look like and allows the public to experiment with magnetism.
- The neodymium magnets will be used with the magnetic field tubes to manipulate the magnetic material inside as well as with the copper pipe to show Lenz's Law with induced magnetic fields.
- The glass prism will be used to demonstrate the diffraction of light into its separate wavelengths and explaining the light's wave properties .
- The diffraction grating shows the wave properties of light.
- The tuning forks will be used to show sound waves and resonance.
- The springs will be used to show oscillatory motion as well as be used to discuss other oscillations.

We feel as if \$490 covers everything related to making our demos including construction materials and any miscellaneous items that are needed to compensate for contingencies.

Our chapter has very few demos in its collection including a cornstarch/water mixture to demonstrate non-Newtonian fluids, so we have a starting point.

The SPS chapter at the University of Florida thanks you for your consideration and hope you can see that we want to spread the love of physics to everyone.