



# 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>	High School Physics Engagement Labs
<b>Name of School</b>	Stony Brook University
<b>SPS Chapter Number</b>	#6786
<b>Total Amount Requested</b>	\$500.00

### Abstract

In an effort to enrich the educational experience of high school students enrolled in physics classes, Stony Brook's Society of Physics students proposes to work alongside both faculty at the university and high schools to provide better lab equipment to conduct more immersive physics labs. The chapter will coordinate with the participating high school in a joint-run lab that specifically supplements their current curriculum.

# Proposal Statement

## Overview of Proposed Project/Activity/Event

Volunteering members of the Stony Brook's SPS general body and executive board will transport themselves to a single coordinating high school, along with pre-determined lab equipment, at an agreed upon time. The volunteers will arrive to the school ahead of time to prepare. The event will be designed such that the participating high school splits their class into groups of no more than two or three. The presence of student groups will promote teamwork and cooperative data collection/analysis. There are three separate ways the event would be run depending on the preference given by the high school. The three separate ways in which the event will be carried out are described in the "Plan for Carrying Out Proposed Project/Activity/event" section. It will be the responsibility of the executive board of SPS to reach out either in person or via email with the participating school to help determine which way the event will be run.

The chapter strongly believes that the participating general body and executive board volunteers will be qualified and passionate for the event. For underclassmen volunteers, their experiences from recently completed high school physics labs will be fresh in their mind. Many members of the club, such as executive board members Nicholas Miklave and Gregory Matousek and a handful of general body members, have completed tutoring trainings approved by the College Reading and Learning Association (CRLA). Their experiences as a campus-paid tutor for introductory physics courses are invaluable to this project's effectiveness, in conjunction with the teaching experience of the participating school faculty.

## How Proposed Activity Promotes Interest in Physics

Integrating labs into physics classes is undeniably satisfying for all students. For physics, the connection between the math on paper to real world applications is left up to YouTube and the imagination for classrooms without adequate lab equipment. Students who learn Faraday's law may never know that a simple battery, wire, and magnet is all that is needed to create an electric motor. It's hard to say students feel giddy about the conservation of angular momentum until they rotate themselves in a seat while maneuvering a fast spinning bike tire out in front of them. Bringing quality lab equipment to a participating high school would foster this curiosity. We recognize that many school districts, some nearby the university, are in high need financially. Schools that have less funding towards physics lab equipment would be encouraged to keep the experimental equipment and continue performing the lab(s) without the volunteer aid of SPS for years to come. This charitable act will make long-lasting waves of inspiration for future generation of students.

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

After a participating high school has been selected, Stony Brook's SPS executive board will work alongside high school faculty to determine how the event should be completed. This proposal lists three potential options below.

1. **After-School (Multiple Labs 1-1.5 hour event)** In this scenario, the Society of Physics students will provide multiple labs as opposed to one. Each volunteer from SPS who participates will be briefed by the executive board and participating school on a specific lab. They will be prepared to teach each student group the setup, any relevant "theory", the data to be collected, and what would be analyzed. The groups, over the course of an agreed upon time, will rotate from lab to lab, volunteer to volunteer, and complete each (if possible) lab. The data they collect may be stored in a notebook or, if relevant, with photographs/stop motion video. The individual data collection, with the presence of and guidance by the volunteers, should take no more than 15-20 minutes. After all student groups have completed the data collection for each lab, the volunteers will help

clean up. With the extra time available in this scenario, a liquid nitrogen ice cream demonstration can be performed as a final refreshment.

2. **During the Physics Class Period (Single Lab : 40-50 min event)** In this scenario, the Society of Physics students and the participating High School's faculty will utilize the awarded funds to purchase materials for one lab. With a longer available timeframe to complete data collection, the lab would contain multiple elements/sections. For example, quality projectile motion guns could be purchased as lab equipment. In one section, students would use vertical heights and horizontal traveling distances to determine the gun's initial velocity. In the following section, they could use this calculation to determine the exact location the now angled projectile gun would send a bead. The lab could be designed to be competitive between students and instructive.
3. **During the Physics Class Period (Multiple Labs : 40-50 min event)** This scenario meshes elements from both of the previous scenarios. In conjunction with the participating High School, the Society of Physics students will utilize the awarded funds to purchase materials for multiple labs. Again, each volunteer from SPS will be briefed on a specific lab and be prepared to help the students out. In this scenario, the participating high school's teacher will inform their students ahead of time the labs which are available to complete. The students will select the labs which interest them, and thus split into groups. On the day of the event, the volunteers will work alongside students in the completion of the lab. The advantage of this scenario is that each group could, at a later date, give class presentations about their experiment and describe their data analysis methods

### **Project/Activity/Event Timeline**

Upon receiving the award, the executive board will immediately reach out to nearby high schools, emailing both head faculty such as a principal and physics teachers. These emails will include brief information about our chapter, the award, and the proposed lab event. The executive board will remain in contact with schools up until the end of February. At this point, a high school will be selected and one of the three scenarios will be decided. An event date in April and May will be determined as well. The last day of school for the University is May 22<sup>nd</sup> so an event date before this would be strongly encouraged, considering many undergraduates (who would be volunteering) leave after their last final (which could be days before the 22<sup>nd</sup>). Based on the current high school curriculum or wants of the participating school, the executive board will coordinate the purchasing of lab equipment/demos using award funds. The purchasing and testing of this equipment, determining club volunteers, and club-run "practice-runs" will be completed by the end of March.

### **Activity Evaluation Plan**

The chief medium for evaluating the success of our efforts will be in the reception of our demonstrations by the high school audience. This will most easily be judged based on the feedback given to us from the teacher and local administration after they have asked the students what they themselves thought of our presentation.

### **Budget Justification**

The budget will aim to lay out the pricing of disposable and non-disposable lab equipment used for the event. An example spreadsheet for the budget is included in the proposal.