



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

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| Project Proposal Title | "DIY" Physics Demonstration Boxes |
| Name of School | University of Rochester |
| SPS Chapter Number | 6010 |
| Total Amount Requested | \$500 |

Abstract

We will create boxes containing three "do it yourself" physics demonstrations to give to students in Rochester city schools to provide a fun and engaging way to learn physics while being socially distant. They will be accompanied by instructional videos or a virtual meeting conducted by volunteers.

Proposal Statement

Overview of Proposed Project/Activity/Event

The “DIY” Physics Demonstration Boxes will be created by the University of Rochester SPS chapter members. We hope to create 200 boxes to give to local middle schools to distribute to students. We will provide these schools with pre-recorded instructional videos containing information about how to assemble each demonstration as well as a short lesson on the topic for the students. In addition, we will offer a live version of these instructions and lessons via a virtual meeting(s), in order to maintain social distancing, if schools prefer to have University of Rochester students explain the demonstrations live. This also will give the students an opportunity to ask questions. Each box will contain three demonstrations: a diffraction grating, build your own popsicle stick catapult, and a make-your-own constellation circuit. These demonstrations will be accompanied by a brief lesson about light, projectile motion, and circuits, respectively. The goal of this project is to promote an interest in physics in middle school aged students and expose them to a variety of branches of physics: modern physics, mechanics, and electricity & magnetism. The intended audience of these “DIY” Physics Boxes will be 6-8th grade students in Rochester city schools. We estimate that approximately 200 middle school students will receive the boxes and approximately 15 volunteers will contribute to this project.

This project was first envisioned by members of the chapter’s Outreach Committee who were brainstorming on ways to promote an interest in physics among students in the Rochester community. Being situated only fifteen minutes away from downtown Rochester, our SPS chapter is in an ideal position to work with the numerous surrounding middle and high schools, many of which are primarily made up of students who are underrepresented in physics, to promote interest in the subject. The idea for “DIY” boxes arose in response to limitations imposed on outreach due to COVID-19. We want to provide a way for students to see physics concepts at work first hand while at the same time maintain the social distancing and COVID-19 safety requirements implemented by the state of New York, the city of Rochester, the University of Rochester, and each individual school. By creating boxes of interactive physics activities, students will be able to participate, regardless of their learning situation (remote, in-person, or hybrid).

How Proposed Activity Promotes Interest in Physics

This “DIY” Physics Demonstration Boxes project will be successful in promoting interest in physics among students and the general public because it provides a way for middle school students to learn about physics through fun and interactive methods. This project will also strengthen our relationship with local middle schools, making way for future collaborations. By presenting each student that participates in the “DIY” Physics Demonstration Boxes with an opportunity to apply physics concepts first hand, they will become more engaged in the learning process. When students are able to experiment and interact with physics lessons, they will be able to ask questions, be curious, and explore why the world works the way it does. By including demonstrations about light, projectile motion, and circuits in the “DIY” Boxes, we intend to provide students with lessons about physics concepts which noticeably apply to their daily lives. It is our hope that being able to see how physics applies to everyday life will spark students’ curiosity and encourage them to ask questions about how the world around them works. By giving these boxes to middle school aged students, who are exposed to a wide range of science disciplines in their science classes, we will be able to increase their enthusiasm for the study of physics and encourage them to seek opportunities to learn more about physics as they enter high school in the form of classes and extracurricular activities. In the past, our SPS chapter has collaborated with local middle schools, as well as elementary schools, for outreach activities. Through this project, we are seeking to maintain and strengthen these relationships, in spite of the challenges presented during these uncertain times. These partnerships will allow us to continue to encourage interest in physics

among young students, many of whom are underrepresented in physics, in the Rochester area in the years to come.

Plan for Carrying Out Proposed Project/Activity/Event

Fiona Gaffney, the chapter Outreach Chair, will be in charge of coordinating this project. She will be responsible for contacting the schools as well as organizing the volunteers to create the boxes, record the instructional videos, and give live, virtual instruction. Our chapter President, Molly Griston, will monitor progress throughout the project and provide additional support. In order to market this project to our target audience, middle school students in the Rochester community, we will be reaching out via email to nearby middle schools and middle school science teachers to inquire if they would be interested in participating. Approximately 10-17 SPS members or volunteers will likely participate in this project. Some of these volunteers will assist in assembling the “DIY” boxes (6-8 volunteers), some will participate in the recording of instructional videos (2-3 volunteers) and others will assist in the live, virtual instruction (4-6 volunteers). Volunteers will be recruited from the our SPS chapter as well as the University of Rochester Society for Women in Astronomy and Physics (SWAP) and the University of Rochester Astronomy Club. There are members of our executive board who have a specific expertise in this type of project. Executive board members have already planned several virtual events throughout this year as a result of COVID-19 and our President has experience teaching physics to middle school aged students by being a University of Rochester PREP Program instructor.

Project/Activity/Event Timeline

The “DIY” Boxes will be distributed to participating schools in early April 2021 along with access to the pre-recorded instructional and lesson materials. Schools will, at this time, have the opportunity to schedule a time for live, virtual demonstration and lessons, to be held at some point in mid to late April. Demonstration assembly instructions as well as accompanying lessons will be recorded in late March 2021. A room at the University of Rochester will be reserved in order to do this two weeks in advance, and all state and school social distancing regulations will be followed. The “DIY” boxes will be assembled in early March 2021 by SPS volunteers. Materials for the “DIY” boxes will be ordered and/or purchased in early February 2021 in order to allow time for all materials to ship or be found. Schools will be contacted in early January 2021 regarding the opportunity to participate in this activity. Schools will have until early February 2021 to confirm participation and the number of participants. This will give us adequate time to create the correct number of “DIY” boxes for students.

Activity Evaluation Plan

In order to evaluate the success of the Physics “DIY” boxes, we will be asking teachers and student participants for feedback regarding their interest in the activities provided and the physics concepts introduced. We will also measure the success of this activity by evaluating how many students are able to participate.

Budget Justification

The funds requested would be used to purchase supplies for the demonstrations that will go into the “DIY” boxes. If additional financial support is necessary it will be requested from the departmental budget.