



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Future Faces of Physics Award Proposal

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<b>Project Proposal Title</b>	After-School Activity Series
<b>Name of School</b>	William Jewell College
<b>SPS Chapter Number</b>	8235
<b>Total Amount Requested</b>	\$291.90

### Abstract

Primitivo Garcia Elementary School, named after a Mexican-American hero, serves around 380 students in a diverse area of Kansas City. The WJC Physics Department has enjoyed previous partnerships with this school and would like to offer three after-school sessions on electricity and optics to their 3<sup>rd</sup>-5<sup>th</sup> graders this spring.

# Proposal Statement

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

This project will focus on helping students learn basic principles in circuits, optics, and waves through engagement in activities. Specific activities include constructing greeting cards that illuminate when opened, observing distant objects with simple, homemade refracting telescopes, and learning properties of waves by producing waves with Slinkys. In addition to hands-on activities, students will learn through demonstrations and worksheets. Our project will target around twenty 3<sup>rd</sup> – 5<sup>th</sup> graders. Given the opportunities our department has had for outreach to other groups of children, we've developed a variety of activities and learning outcomes that work well for this age group. Also, while working with this particular group of students in the past, we've seen their excitement for science increase greatly with more active learning experiences. We hope to further this enthusiasm with our outreach program.

## **How Proposed Activity Promotes Physics Across Cultures**

Many Hispanics kids in Kansas City attend schools that do not have much funding for scientific supplies and equipment. Such is the case at Primitivo Garcia School where we intend to offer an after-school program in March 2019. As each session begins, SPS leaders will introduce various concepts and show demonstrations to help students understand basic background. Then leaders will give students an overview of the project and instructions. Students will work on projects under the supervision of faculty and student SPS members.

Ultimately, students from Primitivo Garcia will benefit from increased exposure to scientific studies and projects while William Jewell College students and faculty will benefit from engaging with the rising generation of scientists.

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

Two WJC physics faculty members and the WJC SPS chapter's executive committee will be in charge of planning the outreach program, and five SPS members are likely to participate (four as student helpers and one as an instructor). Both faculty members have extensive experience with outreach to elementary school children, both locally and through their work at a camp in Marfa, Texas. Additionally, we have reached out to the chemistry and biology clubs at William Jewell, and we expect to get a couple of volunteers from these groups. Progress will be monitored using worksheets completed by students during the outreach sessions. Teachers at Primitivo Garcia will spread the word to students in their classes, and WJC SPS students will provide them with concise descriptions of each session.

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

The after-school program at Primitivo Garcia School will take place on 3 separate days during March 2019. The William Jewell College Physics Department and SPS chapter have already worked with teachers and the principal there on various projects, including construction and set-up of an aquaponics system. School officials have approved our proposed program and look forward to our presence there.

Once we return from Winter Break, SPS members and faculty will meet to discuss logistics and order supplies. In addition, we will discuss how to implement the planned activities, which are based on curriculum we developed this semester (Fall 2018) for a local outreach to elementary school students near our college. Following this planning stage, we will meet to decide on how to divide the responsibilities during our time there. Typically, two of our faculty members and 3-5 students participate so that we can accommodate up to 30 students. We expect to be fully prepared to run the program by mid-February. Tentative dates for this outreach are the first 3 Mondays in March.

Once we have conducted the program, we will gather feedback and write our report for SPS. We expect four SPS students and two faculty members to participate.

## Activity Evaluation Plan

SPS expects that 20 students will participate in this after-school program. Teachers from the school have indicated that this number is reasonable for our outreach. For reference, approximately 40 kids attended a Physics Demo Night there three years ago.

As part of our efforts, we have developed a short survey for the kids, mainly asking them what they liked and what they learned from the experience. In addition, teachers, the principal, and parents will be asked for feedback. In the past, we have been able to get valuable feedback from school officials on previous projects. In addition, the school principal is working with us on developing curricular goals that meet state standards.

## Budget Justification

As discussed elsewhere here, our proposed after-school program will engage students in hands-on learning activities focused on circuits, optics, and waves. SPS funds are required to purchase solar car kits and supplies for constructing greeting cards that illuminate when opened.

Students will assemble the greeting cards in the middle of the program, learning more about circuitry as they connecting LEDs to small batteries using wire and copper tape. Prior to assembly students will learn that flow of charge, or current, in a complete loop is required to operate a circuit.

Students will assemble the solar cars near the end of the program after they have learned some basic principles of circuits, optics, and waves. In addition, they will observe that the Sun delivers energy, which can be used to cause the flow of charge. With these concepts in hand, students will assemble the cars.

The following supplies are either already available through WJC Physics Department or they will be purchased by the department: gas for driving to the school, demos, and additional building materials such as cardstock and markers.