



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Marsh W. White Award Proposal

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Project Proposal Title	Physics Outreach in Southern California
Name of School	University of California, Irvine
SPS Chapter Number	0895
Total Amount Requested	\$560

### Abstract

We, The Society of Physics Students at UC Irvine, aim to double our visits to underrepresented Black and Hispanic high schools in the OC/LA area during 2025-2026. This project is founded on our deep commitment to support and bolster representation of minoritized groups within the broader scientific community.

# Proposal Statement

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

The Society of Physics Students chapter at the University of California, Irvine proposes a significant expansion of its established, needs-based physics outreach program for the 2025-2026 academic year. This initiative involves selected board and club members consistently traveling to high schools across the Orange and Los Angeles communities, with a focus on high schools serving marginalized Black and Hispanic student populations. The core project consists of presentations and physics demonstrations, covering topics such as wave mechanics, electromagnetism, and circuitry. Content is adapted specifically to the students' level: visits to junior/senior physics classes emphasize topics such as current physics research, guidance on college applications, financial aid information (FAFSA, scholarships), and high school classroom physics concepts. Conversely, discussions with younger students (middle school to sophomores) are broader and designed to inspire, covering general physics topics, exciting research prospects, and high school academic advice, including guidance on course selection. Each outreach event requires careful planning, preparation of demonstration materials, and logistical support.

This project is driven by three core goals designed to foster greater equity and interest in STEM. First, we aim for education, actively working to inform minority students and students from lower-income high schools on critical, often overlooked opportunities, including financial aid pathways and high school research opportunities. Second, we seek to provide exposure and motivation, which broaden the population of students who understand the reasons for pursuing higher education, particularly in physics. Our third and perhaps most vital goal is centered on visibility. 90% of our current SPS board is composed of minority students in physics, with the president being a Hispanic woman. By showcasing successful physics students who share similar cultural and economic backgrounds, we are positioned to inspire high school students and increase the overall number of minority students in STEM fields. Our outreach is an organic, proven program that began last year, motivated by our deep need to be actively involved in and supportive of the larger OC/LA community.

The intended audience for this program consists of high school physics classes at schools identified as largely marginalized and lower-income in the OC/LA area, with target locations including schools in Compton and Fullerton. During a typical outreach event, our team visits an average of two to three classes at a single high school, with each class comprising roughly 20 to 30 students. Our target for the 2025-2026 school year is to travel to a total of 14 high schools, which translates to impacting a large student body. Based on these numbers, this project will reach an estimated 560 students on the low end and potentially over 1,000 students on the high end.

## **How Proposed Activity Promotes Interest in Physics**

Our project has been engineered and optimized over time to meet our overarching goals. The core mechanism for promoting interest is direct exposure: our project brings physics content and firsthand physics experiences directly into the classrooms of students who have limited access to resources and role models. By tailoring presentations to the students' needs, we transform concepts into opportunities, transforming their perception of physics into an achievable and rewarding field.

Visually engaging demonstrations such as Tesla coils, Snap circuits, and mechanical wave drivers are effective in generating long-lasting interest and giving younger students a chance to experiment with devices in a safe environment. Tesla coils illustrate the concepts of electric fields, conductivity, induction, and ionization. Snap Circuits give students a chance to explore different electrical configurations on their own, promoting the process of "trial and error."

Mechanical wave drivers help to model the standing waves that make up the sounds produced by instruments like flutes and guitars.

Furthermore, the project's emphasis on visibility provides a compelling, personal answer to the question, "Can I see myself in physics?" We are not just promoting interest, we are addressing issues of equity and representation in STEM. By prioritizing high schools with large Black and Hispanic student populations in the OC/LA area, we are placing resources where they are most impactful. Our goal to engage between 560 and 1,000 students in the 2025-2026 academic year demonstrates a massive potential return on investment.

The SPS chapter at UCI has a proven track record with local high schools, successfully executing this program at seven high schools in the 2024-2025 school year. However, the current execution model places a significant monetary burden on our outreach team. Our team members sacrifice personal time, occasionally skip classes, and absorb personal costs for gas and travel expenses to reach these distant schools. Funding is critically needed to cover gas, mileage, and other travel logistics. Securing this support is essential, as it will allow our outreach team to reach our target of 14 high schools without forcing the financial liability onto the members who make this community work possible.

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

Our outreach team engages in detailed communication with their contacts at the schools they visit so that they can best cater their demos to the students they teach. This helps them give relevant demonstrations, broadening students' views while also reinforcing the knowledge that they already have. Having a diverse collection of prepared demos to present to students will massively help to best cater to the needs and interests of every classroom they have the opportunity to visit. Much of the officer staff has experience operating many different demonstrations and explaining the science behind them. In addition, often times we have physics stockroom staff and graduate students accompany us on these outreach endeavors in order to ensure that the equipment returns unscathed and everything goes smoothly

- 1) **Circuit Demo:** Utilizing Snap Circuits (similar to those used in introductory university lectures) to allow for hands-on exploration of electrical configurations.
- 2) **Wave Mechanics:** Using a mechanical wave driver and frequency generator to visually demonstrate the fundamental principles of standing waves and the relationship between velocity and wave properties. This helps to explain concepts relevant to musical instruments.
- 3) **Electromagnetism/Plasma:** The Tesla coil will illustrate concepts like electric fields, conductivity, and ionization in a high-impact, memorable way.

### Project/Activity/Event Timeline

**December** – Reach out to high schools and plan events for the year. Our outreach team attends another outreach-specific meeting each week to coordinate events, in addition to weekly board meetings.

**January** – Buy materials and start demonstration building. We hope to be able to implement our new demos within a month of receiving the award.

**February** – Finish demonstration building and start traveling to schools. The time between acquiring the new demos and using them will be spent by our outreach team familiarizing themselves with the equipment, giving mock demonstrations, and learning the respective topics inside and out to ensure they can answer any questions posed by a student.

**March-May** – Carry out our outreach events.

**May 31st** – Finalize report.

## Activity Evaluation Plan

We can evaluate the success of our activities in meeting the objective through several different metrics. Since the end goal is to help get bright minds excited about physics, a short survey at the end of every outreach event will help get a good idea of whether or not we actually succeeded in this endeavor. This survey would ask questions that would aptly quantify the success of our event by asking questions such as “On a scale of 1-10, how much more likely are you to pursue a career in Physics/STEM?” We also measure our success by observing how engaged the participants are during the more interactive portions of our presentation. Admittedly, a less quantifiable metric but one that proves to be very helpful in fine-tuning our process.

## Budget Justification

The funds earned from this project will help us to purchase these demonstration materials for use at outreach events around the OC/LA area, along with allowing our officers to worry less about the monetary burden that gas costs impose.

**\$140** – A DIY Tesla coil kit would be most effective to demonstrate the process of how the coil is run and how each component contributes to the electromagnetic induction and transformation of a low-voltage input to a high-voltage output.

**\$75** – We would like to purchase two Snap Circuits sets for \$75 (about \$37.50 each, including sales tax), as the extra components would allow us flexibility in the circuits we could demonstrate and students could create.

**\$195** – To demonstrate the concept of standing waves and explain their use in instruments like guitars and flutes, we want to produce a standing wave. To do this, we’d like to purchase a mechanical wave driver from Arbor Scientific to demonstrate these fundamental principles of wave mechanics. The mechanical wave driver would cost \$149, so, including Irvine’s 7.75% sales tax, the total should be around \$195, assuming a \$35 shipping cost via Arbor Scientific’s website’s estimation.

**\$150** – As previously mentioned, our outreach team has been taking on the transportation costs themselves. These costs quickly add up, especially when travelling over 60 miles roundtrip to areas in South LA. To help them focus their efforts solely on planning and organizing outreach events, we’d like to request \$150 for gas and transportation costs.