



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	Engaging Our Youth: Raising High School Students' Interest in Physics Through Thought Provoking and Interactive Demos
Name of School	Lamar University
SPS Chapter Number	3643
Total Amount Requested	\$500.00

Abstract

Our SPS chapter at Lamar University has built a tradition in promoting physics among middle and high-school students in the Southeast Texas area. We plan to continue and expand our outreach activities by hosting more high school visits and organizing road shows with interesting optics and electromagnetism demos with the goal of attracting more students to our program.

Proposal Statement

Overview of Proposed Project/Activity/Event

Our SPS chapter has a long tradition in being actively involved in promoting physics among middle and high-school students in Beaumont and our Southeast Texas area. In the last years we were actively engaged in promoting physics in various forms, from hosting on-campus visits to road shows at middle and high-schools to participating at bigger gatherings such as the Southeast Texas Youth Career Expo organized by the Workforce Solutions of Southeast Texas and the mini-CAST (a regional workshop organized every spring by the Science Teachers Association of Southeast Texas), to list a few examples.

In the past we have benefited of financial support from a NSF-DUE grant, titled STAIRSTEP (2009 –2014) and partially from our institution (2015-2016) through the Office of Undergraduate Research. We plan to continue and expand our outreach activity by hosting more high school visits at Lamar and organizing road shows with interesting physics demos for attracting more students in our program. Because of institutional budget constrain, we are looking for alternatives in sponsoring such activities. Marsh W. White Award will make possible to continue our outreach activities to two target high schools, the Central high-school and the Westbrook high-school, both located in our city. These schools are one of the main feeders for other STEM programs at Lamar University, but not so much of our Physics program. We would like to convince more high-school students to opt for the physics program at Lamar.

Our excellent relationship with the physics teachers Mr. D. Santhana from Central HS (see his letter of interest at the end of this section) and Mr. D. van Pelt from Westbrook HS, who expressed an unsolicited request to bring their students to Lamar or accommodate our presence and host physics demos offered by our SPS members in their classrooms, creates an effective communication bridge between our school and theirs. Thus, Central HS is willing to bring to Lamar 150 students currently enrolled in physics classes, while Westbrook HS has identified a cohort of 50 students interested to visit our facilities and enjoy physics demos.

Our SPS chapter considers it a privilege to have such opportunities to actively engage prospective college level physics students. We will use the experience gathered over the years in road shows to several high-schools and public events to organize reciprocal visits. We are planning to offer interesting demos in the fields of optics and electromagnetics, which are the specialty of our SPS advisor, Dr. Cristian Bahrim. This experience will hopefully trigger in prospect students a true interest in pursuing a physics degree at Lamar University. We know from past experience that the opportunity to visit our Optics laboratory and expose students to thought provoking experiments in optics and electromagnetism has raised their curiosity in physics.

Traditionally, our school is known for the excellent engineering program, and many STEM students consider Lamar for this reason. The success of students enrolled in the physics program in the last ten years (including two recent Beck fellows, two Goldwater recipients, and several McNair scholars) and an active participation to outreach activities and research presented not only to student conference, including the Quadrennial Physics Congress, but also at major professional conferences as well as the organization at Lamar of a regional physics conference, the Joint Spring 2016 Meeting of the Texas Sections of APS, AAPT, and Zone 13 of the SPS has shifted the attention of several prospect STEM students to consider physics as a second major. As a consequence, starting with 2013, our traditional graduation rate of 2-3 bachelors in physics per year moved up to 7-9 bachelors per year. This was possible in part because of the active engagement of our students in outreach activities through a program, called STAIRSTEP, which was sponsored by the NSF-DUE.

The outreach activities made some of our students to consider the professional path of teaching physics in high-school (an example was highlighted in the Spring 2014 issue of the SPS Observer at page 16 “A Passion for Teaching Physics”). Others SPS members moved to graduate programs. An example is Keeley Townley-Smith, a physics student featured in the Summer 2014 issue of the SPS Observer (<https://www.spsnational.org/the-sps-observer/summer/2014/transitioning-student-researcher>) is now in the graduate program of University of Rochester.

CENTRAL MEDICAL MAGNET HIGH SCHOOL

88, Jaguar Drive, Beaumont - 77702

Mr.Sathanan Duraippandian M.sc, B.Ed, Physics Instructor, Room S101, Phone: 409 617 5300, Extension: 4064

Email: dsathan@bmtisd.com

Date: 10/19/2015

Sub: Thanking Letter

Mr.Surakka and me, the Physics Educators of the Central Medical Magnet High School, Beaumont ISD have taken our 5th and 7th period physics students to the Physics Department at the Lamar University on 10.06.2015 for attending 1 hour and 30 minutes of Physics Lecture on **'Introduction to the Science of Physics'** by the Physics Professor, Dr.Bahrim.

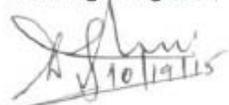
The Physics Professor, Dr. Bahrim, who has immensely inspired our physics students to a greater extent so that they could get motivated to learn physics better than ever before, and appreciate the importance of physics as the basis for the wonder world of all modern technologies.

On behalf of our students and our school community, I sincerely thank Dr. Bahrim and his associates for providing our students with an inspirational learning experience through fun filled cool physics experiments and lecture on the important physics concepts.

I also request the Physics departments of Lamar University and Central Medical Magnet High School, Beaumont ISD to arrange such educational programs in future more often to support our students acquire necessary physics knowledge and skills, and help them grow as productive citizens.

Words are never enough. Thanks again.

With High Regards,



(D.Sathanan)

"Knowledge is an Immortal Light."

How Proposed Activity Promotes Interest in Physics

In the past our physics demos have included mainly electromagnetic phenomena and optics. In particular the spectroscopic observations of light sources using diffraction gratings have been very popular among high-school students. With the goal to emphasize the impact physics has on practical knowledge and technology, we plan to refine our present set of demos and expand the panel of options with new, attractive experiments of interferometry and diffraction on crystals and nettings. Additionally, we want to set up nice experiments using optical fibers. We also plan to offer to student visitors the chance to build a simple electric motor using a small

coil, a battery and a little magnet. The money from the Marsh Award would be used to buy these components and also offer a pizza lunch for our visitors while at Lamar.

Plan for Carrying Out Proposed Project/Activity/Event

- **Personnel** – The SPS chapter will be involved in setting up and running the physics demos. The SPS advisor will be actively engaged in all steps of the project.
- **Marketing** – We will advertise our activities through Lamar website (see a recent example <https://www.lamar.edu/news-and-events/news/2016/05/stairstep-hosts-campus-visits-for-central-magnet-high-school.html>).
- **SPS member participation** – We will have at least five SPS members present to any outreach activity. We will offer to Lamar students from other STEM programs, in particular from the engineering fields, mathematics, computer science, and biology, with whom we have close collaborations, the opportunity to join us.
- **Expertise** – Most of the SPS members had at least one-year experience in running outreach events, including through the STAIRSTEP program led in Physics by the SPS advisor Dr. Cristian Bahrim for the past eight years.

Project/Activity/Event Timeline

January 2017 – Planning the visits of the Westbook HS and Central HS to Lamar.

February 2017 – Purchasing materials, preparing new optics demos including experiments of interferometry and diffraction on crystals and nettings and set up a few experiments using the SmartLab Fiber Optics kit.

March – April 2017 – Hosting on-campus visits of students from Westbook HS and Central HS. Visiting at least one of the two high-schools and offering an attractive physics show to a larger group of high-school students.

Activity Evaluation Plan

Each of our SPS student participant will write a paragraph about his/her experience in each outreach event. These testimonials will be compiled into an article which will be submitted to our Lamar's University Press for publication. We will also offer a short questionnaire to prospect students willing to join Lamar in order to measure the impact of our physics demos and the students' interest to join our Physics program. We will build a database which will help us to stay in contact with prospect students prior to their arrival at Lamar and to motivate undecided students to come to Lamar. We plan to facilitate earlier communication between prospect high-school students and Lamar physics students and faculty.

Budget Justification

1. Building simple electric motors, with magnet wires (cooper wires with an enamel coating), D-cell batteries, and little ceramic magnets. This simple gadget will teach students the way we can produce rotational motion in a current-carrying wire and show the principle of the electric motor. We believe that this experience will stimulate the interest of some high-school students to join our Physics program at Lamar.
2. Buying a set of fiber optics lab kits from SmartLab with a transmitter web bench and a receiver work bench to make students to build (using electric wires and fiber optics) various setups for creating simple projects involving optical communication with basic electronic circuits. We believe that this experience will stimulate the curiosity of prospect students in Optical Communication and will open the interest to come back to Lamar's optics lab for more research expose with physics majors and faculty.
3. We plan to sponsor a pizza lunch for on-campus visitors.