



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Future Faces of Physics Award Proposal

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Project Proposal Title	Taking Classroom Physics Further: Promoting Interest in Physics in the local Community
Name of School	Texas State University
SPS Chapter Number	6682
Total Amount Requested	\$292.00

### Abstract

Texas State University's SPS Chapter will perform physics demonstrations at the local public schools at all levels in San Marcos, TX in an effort to encourage their interest in physics as a potential career path and to help local students feel more connected with their local community and the scientific community at Texas State.

# Proposal Statement

## Overview of Proposed Project/Activity/Event

The Texas State University (TXST) SPS chapter would like to use the funds provided by the Future Faces of Physics Award to purchase supplies needed to construct a bed of nails that will be used as a physics demonstration during local outreach events. The TXST SPS chapter has an established rapport among the local San Marcos Consolidated Independent School District (SMCISD) schools for outreach events. In the past, our SPS chapter has visited all of the public schools in the city and has performed physics demonstrations in an effort to promote interest in physics among K-12 students and unity among the university and the local citizenry.

This year, SPS plans on performing physics demonstrations for the AP and non-AP physics courses at San Marcos High School, as well as for 6<sup>th</sup> and 8<sup>th</sup> graders at both middle schools in San Marcos. These classes are in the midst of teaching physics to its students, and it is SPS's hope that our demonstrations will go above and beyond what is normally taught, inspiring higher level interest in STEM in general, and physics in particular.

In the past, our SPS chapter has used reformed teaching methods during physics demonstrations at local schools, with an emphasis on small-group work, collaboration and discussion, inspired by the new and growing Learning Assistant (LA) Program here at TXST. By conducting interesting, practical, fun activities in the classroom in a way that mimics the LA Program, we hope to encourage the science educators at all levels of education in SMCISD to explore using research-based teaching methods in their lesson plans. This will effectively increase the scope of the SPS mission by allowing a more effective way of promoting student involvement in STEM fields without having to maintain a constant presence in the classroom.

## How Proposed Activity Promotes Physics Across Cultures

San Marcos is a city of two identities: local citizens and university students and/or staff. Though the city and the university continually seek to work together and promote unity, many local citizens, and the local students in particular, do not feel connected to the university. San Marcos CISD is comprised of 72.5% Hispanic students and 68.75% of their students are economically disadvantaged. With such a high percentage of students being economically disadvantaged, many students feel that a higher education is simply not an option for them. By promoting physics through our continuing outreach efforts at the local schools, we will be able to give the local students a connection to the university, inspiring them to think more critically about their options after high school.

By engaging disadvantaged minority students directly in the classroom with meaningful, fun, and educational activities, we can transform their classrooms from places where they may feel uncomfortable or unwelcome, to a place where they may instead look forward to learning the many fascinating ways that physics presents itself on a day to day basis. By providing an interactive and hands-on experience, we will be turning their classrooms into a welcoming and supportive environment, one that constantly encourages them to see themselves as capable, needed, problem solvers.

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

Personnel: Our Head of Local School Outreach Committee, Michael Moritz, with support from our SPS President, Elizabeth LeBlanc, will be in charge of planning and executing these events. Progress will be monitored through reports from the committee delivered to the SPS membership at weekly meetings.

Marketing: The planned outreach events are being carefully marketed in close communication with the SMCISD Science Coach. The consensus is that SPS will perform demonstrations during multiple science classes instead of normal class activities. Attendance is expected to be about 150-200 students at each middle school (total of 2 middle schools), and about 50-100 students at the high school without the need for additional advertisement.

SPS member participation: In addition to the 7 members of the Local School Outreach Committee, we expect approximately 5 to 10 additional SPS members to participate in each event.

Expertise: Our Head of Local School Outreach Committee, Michael Moritz, is in his second year leading this committee, and such, has a full year's experience of performing outreach at our local schools. In addition, many of our members are graduate students and upper division undergraduates who have theoretical understanding of the demonstrations to be performed. Many of our members have also been Learning Assistants and/or Lab Assistants for the Physics Department at TXST and have experience communicating physics concepts.

The committee head of school outreach, Michael Moritz, is already in contact with coordinators at each school, and upon completion of construction for the proposed demos and after a lesson plan for the demo has been produced, Mr. Moritz will schedule an event time with each school. Meetings will be conducted as necessary to staff each outreach event, and a minimum of one rehearsal meeting will be conducted where the SPS member leading the outreach activity will discuss with volunteers the demos to be performed, their setup and safety precautions, as well as the relevant theory and talking points to be discussed. Included in the talking points will be the identification of conceptual areas of the demonstrations that will be most troublesome for the students, as well as offering suggestions on ways to offer positive criticism to correct those misunderstandings that students may have in order to maximize the educational impact of the demonstrations. Emphasis will also be placed on presenting the demonstration in a fun and engaging way, promoting the participation of all the students in attendance.

## Project/Activity/Event Timeline

Demonstration supplies will be purchased within the first week of funds being awarded to the SPS chapter. Once supplies have been received - approximately 3 weeks from the awarding of funds - demonstrations will be constructed within one week. The demonstration will be completed and ready for implementation at outreach events approximately one month from the awarding of funds. Implementation of the lesson plan for the demonstration will take place immediately following the construction of the demonstration.

Because the funds requested are for the implementation of physics demonstrations at outreach events, and because the SPS chapter will not schedule the demonstration at an outreach event until it can be successfully implemented, it is not possible to provide further detail on precisely when outreach events using this demonstration will take place. Historically, however, our chapter of SPS is known for

conducting on average one to two outreach events per month when school is in session. If funds are awarded, then this demonstration is guaranteed to be incorporated into the outreach schedule that is already outlined by our chapter.

## Activity Evaluation Plan

Because our proposal deals with local school outreach involving direct interaction with diverse student populations, a very effective method of evaluation presents itself in documenting the outreach event through media and directly observing how much fun the students are having with the demonstration and gauging how much the students gain from the demonstration educationally. Since the demonstration is repeatable, adjustments to the presentation can be made each time the demonstration is used, and those changes can be evaluated on the above stated criteria comparatively.

## Budget Justification

Our SPS chapter has already met with the science coach for SMCISD this year. In order to accommodate requests from teachers in the district, the entire proposed budget is to be used in construction of a new physics demonstration that will specifically address mechanics concepts that are taught in the SMCISD curriculum at the target grade levels. This new demonstration will consist of a bed of nails that a SPS student will lay down on in order to highlight the differences between force and pressure.

The Texas State University SPS chapter recently received funds from the University through an Equity and Access grant to purchase physics demonstrations for local outreach. These funds helped our chapter purchase a bicycle wheel with handles. This item is a beautiful demonstration on angular momentum which will be used in conjunction with the bed of nails demonstration in an effort to focus on mechanics concepts.