



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Future Faces of Physics Award Report

Future Faces of Physics Award Proposal

Project Proposal Title	CSUSM Society for Diversity in Physics
Name of School	California State University San Marcos
SPS Chapter Number	0853
Project Lead (name and email address)	Co-President, Josefa Gregorio (grego017@cougars.csusm.edu) SPS Advisor, Justin Perron (jperron@csusm.edu) Planetarium Committee Lead, Edwin Robles (roble028@cougars.csusm.edu) Planetarium Committee, Jesus Perez (perez244@cougars.csusm.edu)
Total Amount Received from SPS	\$500
Total Amount Expended from SPS	\$272

Summary of Award Activity

The CSUSM Chapter of Society of Physics Students (SPS) organized a physics outreach event for 8th grade students from San Marcos Middle School. This school has many students from underrepresented minority groups as well as socioeconomically disadvantaged students. Mrs. Brice's 8th grade science students were taken on a tour to the local Palomar College Planetarium. They also viewed presentations to learn about the opportunities a student has if pursuing a Physics or other STEM-related degree as well as community outreach activities, such as hands-on learning with Physics demonstrations.

Statement of Activity

Overview of Award Activity

Our outreach event involved Mrs. Brice's 8th grade science students (122) as they began studying the solar system. These students were taken on a tour to the local Palomar College Planetarium, which is approximately 15 minutes walking distance from the middle school. These students were then split into two groups because the Planetarium seats about 180 people. While we were expecting 180 students to attend this event, some students did not

attend because permission slips were not turned in on time. While at Palomar College, group (A) attended the Planetarium Show while group (B) had hands-on learning with physics demonstrations and learned about the importance of studying a STEM-related major when these students get to college. These groups then switched places after the first *Explore the Solar System Show* was done at 11:15 am.

Our goal with the project was to expose these kids to the wonders and possibilities of careers in STEM. Many of these students come from backgrounds of socioeconomic struggle that lack participation in the professional science fields. These students undergo a curriculum of math and science that can be difficult and 'dry' at times, and being exposed to the non-textbook and real-world applications side of the curriculum can motivate and push these kids to stay committed to STEM. Many will be the first in their families to attend college and research shows that they are more susceptible to failing if they choose a STEM major. A huge reason for this is due to a lack of exposure at an early age and a belief that a STEM career is something in which they can't take part or succeed in.

As SPS members, we are already hooked and motivated to pursue physics. For this reason, it is a major, if not the main goal of our SPS chapter to engage in community outreach. This year we have connected with many URM (underrepresented minority) schools to go onto their campuses, conduct and perform science demos as well as to talk to them about us, our school, and of course, Physics. We also conducted large events within this past year, such as our *STEM in your backyard* and *Super-STEM Saturday* events. These events were weekend events that allowed people from all ages (aimed at K-12) to come and learn as they observe and take part in the dozens of demos that were offered. The parents of the students were also welcomed and for many it was an opportunity to see what is potentially stored in their child's futures and/or to see what their child does.

Our trip to the planetarium showed these students many possibilities. It showed them that they could go to college and study whatever they want to, that they could conduct research in the field of their choosing, as well as have what it takes to become a scientist in the STEM community. However as great as these accomplishments may be, they were not the only ones who had benefited from this experience, for we had brought our community closer together. The teacher of these 8th graders, Mrs. Brice, was overjoyed that her students could experience and partake in this event. We now have connected with this school and aim to make this field trip a recurring event with each new class. The students themselves were highly impacted by having presentations and interactions with us. They got to connect and hear the story of one of their own alumni, Planetarium Committee member Jesus Perez. As for ourselves, we have connected with the teachers and staff so that we can network and build not only our own future, but our communities as well.

Impact Assessment: How the Project/Activity/Event Promoted Physics across Cultures

Overall, the goal of this project was to help promote physics across cultures through

educating middle school students about the STEM-related academic opportunities they have when attending a higher education facility as well as through hands-on learning with physics-related activities. Providing a diverse range of volunteers also helped promote the ideas of mentorship across cultures, as this idea is very important for students at this age. The proposed project goals for this field trip included the following:

- 1) Design a field trip that helped impact student learning associated with Physics and the sciences.
- 2) Provide a positive learning atmosphere and mentorship role for students to feel connected to STEM and Physics through educating the masses with PowerPoint Presentations as well as hands-on learning activities.
- 3) Promote the Applied Physics Department at California State University San Marcos and share the opportunities/benefits a student has while attending this university through stories and testimonials provided by the members of SPS.

These project goals were met by assembling a committee of four current SPS members, who would meet 3-4 times a week for planning, organizing, and brainstorming ideas for this outreach event. In these meetings, roles and tasks were assigned to each committee member. Responsibilities amongst the committee included the recruitment of volunteers, record keeping of contact information, booking and contacting Palomar College and the Planetarium for space/availability, designing effective and engaging presentation materials as well as doable, hands-on activities for the students, attend meetings with the San Marcos Middle School faculty discussing the event, collaborating with the Palomar STEM center and assigning tasks to their organization, and setting up an informational meeting/training with the SPS volunteers signed up to help facilitate the outreach event.

In addition to the committee, we could measure success with the event through giving the students that attended this outreach event with two different surveys. These surveys were agree/disagree questions that had to do with statements relating to STEM, the ideas of mentorship, and pursuing a college education after graduating from high school. A pre-survey was given a day before the students had attended the outreach event. A week later, a post-survey was given with identical and similar questions to see if opinions amongst the students had changed after attending this event.

As a result, 6.3% of the students that attended the field trip had no interest in pursuing a college degree, with 12.6% of the students unsure, and 81% agreeing to pursuing a college degree. After this outreach event, this number decreased in disagreement to pursuing a college degree at 2.75%, 11.92% unsure, and 85.32% with agreement to pursuing a college degree. The ideas of agreeing to pursue a science degree while in college also increased from 25.2% of the students surveyed before the event, to 33.02% after the outreach event. Students also showed improvement in terms of understanding what the acronym "STEM" stands for. On the pre-survey, 82% knew what the acronym "STEM" stood for. After the event, 97% of the students that attended the event knew what "STEM" meant. Another interesting statistic that came about from this event included the student's perception of having a mentor. Before attending this field trip, 19.8% of the students disagreed with the statement

that “having mentors I can relate to is important to me.” After attending this outreach event, this number decreased to 5.50% in disagreement with that same statement, resulting in 61.47% finally agreeing to the fact that mentors do play an important role in a student's education.

Impact Assessment: How the Project/Activity/Event Influenced your Chapter

With SPS hosting this event, this outreach opportunity allowed SPS members to come together and make a difference in the community. They could develop skills in leadership and mentorship through providing guidance and assistance to the students that attended this event. Whether it was ensuring that students were on task and safe when it came to the hands-on learning activity or sharing their experiences as a college student and answering questions that came up during the presentations, all were positive, effective contributions in making this event successful.

Relationships within our chapter had also strengthened, including the relationships our chapter has with our local community colleges; Palomar and Mesa Colleges. We could obtain great leadership/mentorship and provide a vast array, of diverse volunteers through providing an informational, recruitment flyer that showed the benefits of volunteering for this event. Also, by holding an informational meeting/training session, our volunteers felt more prepared and organized when it came to the day of the event. They knew what to look out for with the students as well as understand their role as a volunteer/mentor.

Other skills that were gained from this event included the Planetarium Committee to become IRB-Certified. Since these surveys were taken by human subjects, we needed to make sure this research study was allowable, without running into problematic rules and regulations that restricted us from carrying out the survey components to our outreach event. Therefore, it allowed us to cross disciplines and look at these surveys from a psychological perspective. This then led to the creation of an undergraduate research project with college credit for Planetarium Committee Lead, Edwin Robles. As part of the Planetarium Committee, he could help organize and plan this Physics-related event from the conceptual phase to making this outreach event a reality. In addition to the planning and organization of this field trip, the data analysis associated with the pre- and post-surveys the students had to take were also analyzed by him to help further our understanding of how socio economic disadvantaged students and underrepresented minorities are effected through outreach events, such as this.

Key Metrics and Reflection

The Future Faces of Physics Award is designed to promote projects that cross cultures. What cultures did your project attempt to bring together? (Please be as specific as possible.)	Hispanic Minority that are socioeconomically disadvantaged.
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How many attendees/participants were directly impacted by your project? Please describe them (for example "50 third grade students" or "10 high school volunteers").	122 middle school students from the 8 th grade, 4 middle school students, 25 volunteers from CSUSM SPS Members & Alumni, Palomar College, and Mesa College.
How many students from your SPS chapter were involved in the activity, and in what capacity?	16 volunteers from our CSUSM SPS Chapter.
Was the amount of money you received from SPS sufficient to carry out the activities outlined in your proposal? Could you have used additional funding? If yes, how much would you have liked? How would the additional funding have augmented your activity?	We had sufficient funds to take these students to the Planetarium. However, in the future we plan to carry out this event and could use additional funding to slowly expand this to another middle school; potentially Vista.
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	Yes, with the success of this event and from the support of our Physics department and CSUSM, we plan to have this outreach event happen again.
What new relationships did you build through this project?	We could build stronger relationships between CSUSM, our local middle school, and our local community colleges.
If you were to do your project again, what would you do differently?	Have more time to plan the event so we can notify companies who are interested in giving career exploration talks/presentations.

Press Coverage (if applicable)

The CSUSM SPS Chapter did not receive any press coverage in relation to this award or project.

Expenditures

The costs associated with this event included purchasing admission to the Planetarium for the participating students. Mrs. Brice teaches five periods of 8th grade science. There were approximately 180 students in her classes. We were expecting 180 students to attend this event. However, some were not able to attend because permission slips were not turned in on time. The Palomar Planetarium admission was \$4 per student. Our CSUSM office of Research contributed \$272 to pay for the remaining balance of admission costs. With the remaining balance, we could provide lunch for our volunteers and staff.

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Planetarium Tickets	We requested \$500 funds for tickets	\$500
CSUSM Office of Research	To cover remaining balance for tickets	\$80
Lunch	Costco Pizza for volunteers	\$60
Total of Expenses		\$620

Activity Photos



The Palomar Planetarium

Credit:
Dr.Perron (SPS Advisor)



San Marcos 8th grade middle school students with teachers and volunteers/mentors.

Credit:
Mrs. Brice (8th grade science teacher)



What is Plasma? presentation by Jesus Perez (SPS member, Planetarium Committee)

Credit:
Josefa Gregorio (SPS, Co-President)



Rocket Film Canister demonstration by Maria Vidaca and Melvin Miranda (Palomar STEM ambassadors)

Credit:
Josefa Gregorio (SPS, Co-President)



Rocket Film Canister demonstration Melvin Miranda (Palomar STEM ambassadors)

Credit:
Josefa Gregorio (SPS, Co-President)



Some of our diverse
Volunteer/Mentor team:

Daniel Sanchez, Ky Tisdale,
Christopher Ballecer, Jassan
Ozuna, Duc Ngo, Lorena
Aguirre, Bibiana Uriquiza,
Farrah Beattie, Edwin
Robles, Carina Maciel, Jesus
Perez, Joy Lopez, Nick
Cypher, Gino Barnaba, Victor
Bolanos, Sam Felipe, and
Ivan Heredia.



Group A in the 1st *Explore the
Solar System Show* at 10 am.

Credit: Gino Barnaba



Group B in the 2nd *Explore the
Solar System Show* at 11:15
am.

Credit: Gino Barnaba



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If you have any questions, please contact the SPS National Office Staff
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