



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Future Faces of Physics Award Report

Project Proposal Title	The Stuff in Space
Name of School	Saint Joseph's University
SPS Chapter Number	6186
Project Lead (name and email address)	Joe Popp (jp735250@sju.edu)
Total Amount Received from SPS	\$500.00
Total Amount Expended from SPS	\$500.00

Summary of Award Activity

The Saint Joseph's University SPS chapter visited Motivation High School in Philadelphia to introduce underrepresented students in physics to topics in astronomy and other interesting phenomena in space to get them more interested in the subject. We discussed how the simple concepts they learned in their physics classes can be used in these topics. There was a lot of good feedback with students saying they enjoyed learning about these topics. Some even said the event has impacted their future plans after high school.

Statement of Activity

Overview of Award Activity

- Brief description
 - Our project consisted of teaching high school students at Motivation High School about four different topics that relate to “The Stuff in Space”. The first was the expansion of the universe. Using the students’ knowledge on the doppler effect of sound, we discussed how this effect can be translated to space and how this concept was used to determine that the universe is expanding. The second was the lifetime of a star. The concept of the equilibrium of forces and newtons second law was used to explain how the star’s gravity and changing nuclear force combine to create its stages of life. The third was the discovery of dark matter and how we know it exists. We used the concept of centripetal force and acceleration to show how without dark matter, the outer stars in a galaxy should fly away given the speeds they spin at, so there must be some extra mass inside the galaxy keeping it all together. The fourth and final station was a very brief introduction to special relativity using their knowledge of the velocity of objects. In order to teach all the students every topic, we decided to have four stations, each run by one of our SPS members, with which the students would move between. Each station was a little over ten minutes long during a period of about fifty total minutes. The event took place over a total of two periods with two groups of students and a lunch break in between. There was a brief introduction explaining who we were, why we were there, and what we were going to do. There was also a survey sent out to each student afterwards to get their feedback and what they did or did not like about the event.
- Outcomes
 - Throughout the event, the students seemed much more interested in these topics than I had anticipated. They seemed to be eager to learn about the stuff in space being very present for the presentations and asking a lot of good questions. There were many instances where I was unable to answer any more questions since they had to move on to the next station. There was a section in the survey at the end however that allowed for students to ask any questions that were unable to be answered or that they thought of after the fact with which we responded to them through email. Many of the students completed this survey after the event and there was only praise for the event saying how the topics were very interesting and the demos were clear and informative. Some students even said that their future plans for college and a career have been altered as a result.
 - Along with the impact on the students, we now have started a relationship with this high school in which we may continue to hold our future faces events in the future.
- Audience
 - The target audience was high school physics students at Motivation High School in Philadelphia. The student representation at the event was made up of majority underrepresented groups in physics with the largest representation by Black or African American students. In each period we had about 25 students (~6 students at each station) totaling about 50 students attending the event.
- Context of the Project
 - The opportunity for this project came when an alumni of the chapter reached out to us knowing about the future faces award. She was a recent graduate and was very involved

with the activities in SPS. She recently became the physics teacher at Motivation High School and decided this could be a great opportunity for both of us. Along with the future faces award, we also received a grant for the March White award so as to be fully involved with promoting physics outreach to those who would not otherwise learn about it. Being especially in love with space and astronomy in general, I decided on the theme and came up with the topics since I knew more about this focus in physics than anything else.

- Highlights and stories
 - When presenting special relativity, I found it interesting how different the groups responded to it. Every group I talked to seemed to be quite fascinated by what I had to say but in different ways. Either they were completely invested by what I was saying and not saying a single thing, or they were asking questions every other sentence about something they thought was interesting. In either case, however, everyone seemed to be paying full attention.

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

The goal of this project was to promote physics to underrepresented groups in Philadelphia at Motivation High school by connecting what they have been learning to interesting applications in astronomy. We wanted to provide motivation for the students to pursue physics because they enjoy it, even if it can get frustrating in a classroom environment. I feel we have definitely met this goal in that most of the students out of the group of 50 seemed to be extremely interested and wanting to learn more. Along with this, we were able to kindle the start of a relationship with the school so as to be able to continue this outreach to many more students who end up taking physics there in the future. In the survey sent out to each of the students after the event, we asked about how they liked the event, their plans for the future, how the event may have impacted their plans, and a section to ask any questions. Unfortunately, I was only able to get 11 people to respond to the survey, so I am unable to give accurate statistics on demographics. However, all 11 students explained how much they enjoyed the event with nothing bad to say. Three of the 11 students told us that the event has impacted their future plans after high school. The students really liked the demos and said that their view on space has changed. One student said, "it changed my former perspective."

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

For those involved in managing and running one of the stations, it was important to be able to explain their topic thoroughly but also concisely in a manner that made sense to the students. They had to learn enough about their topics to present on it and be able to answer all the questions that could be asked. There were four of us presenting, and two others volunteering to help run the event. Everyone involved was able to see how interested these students were in the presentations they prepared, which has made this quite a memorable experience. Before the event, we had many discussions, meetings, and demo tests that brought us closer as a chapter and as friends. We now know how to work together well to create a well-made event. Many of the presenters initially knew nothing about the topics they were teaching, so they were able to gain a new understanding and appreciation of the fascinating physics that goes on in space. Some of the volunteers also pointed out how different the school was that we held the

event at from their own high school and became more appreciative and understanding of the struggle some of these students and teachers go through on a daily basis. I believe this is one of the main reasons this event will have a long-lasting impact on many of the volunteers.

Key Metrics and Reflection

<p>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.)</p>	<p>Our Projected promoted physics to mostly Black or African American students as well as some Asian students and Hispanic students</p>
<p>How many attendees/participants were directly impacted by your project? Please describe them (for example “50 third grade students” or “10 high school volunteers”).</p>	<p>About 50 high school physics students</p>
<p>How many students from your SPS chapter were involved in the activity, and in what capacity?</p>	<p>7 total members were involved where 6 students volunteered in the event (four presenters, one photographer, and one timekeeper)</p>
<p>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?</p>	<p>The amount of money received was sufficient</p>
<p>Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.</p>	<p>Yes, we hope to work with this school again to perhaps provide physics mentors and start a physics club</p>
<p>What new relationships did you build through this project?</p>	<p>We strengthened relationships within our chapter, as well as built one with the teacher at the school</p>
<p>If you were to do your project again, what would you do differently?</p>	<p>I would look for demos online rather than craft my own so I know that they work before hand. I would also have the students do the follow up survey during the period rather than afterwards to get better participation.</p>

Press Coverage (if applicable)

If your project received press coverage, please include references or URLs to the coverage. When possible, attach copies of articles to this report.

Expenditures

Please provide a brief explanation of your expenses. Include a written description of your expenditures below, those covered by your SPS funding and by other funding sources, and then fill in the table with the name and cost of each item purchased with your SPS funding. Add rows as needed.

Extra \$1.77 and taxes came from our chapter's funds. The momentum station had been cut due to time constraints after the return window for the products closed.

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Star Beads	Centripetal force demo	6.99
White Boards	One for each station	114.95
Dry erase marker set	One for each station	37.45
Slam Ball	Momentum demo (cut)	30.99
Silicone mat	Centripetal force demo	13.99
Balloon hand pumps	Doppler effect and equilibrium of forces demos	10.97
Folding easel	To hold white boards	89.95
Balloons	Doppler effect and equilibrium of forces demos	7.99
Floor scooter	Momentum demo (cut)	27.98
Motorized rotating display	Centripetal force demo	28.99
Tungsten cube	Equilibrium of forces demo	73.99
Doppler ball	Doppler effect demo	26.70
Kids pottery wheel	Centripetal force demo	30.83
Total of Expenses		501.77

Activity Photos



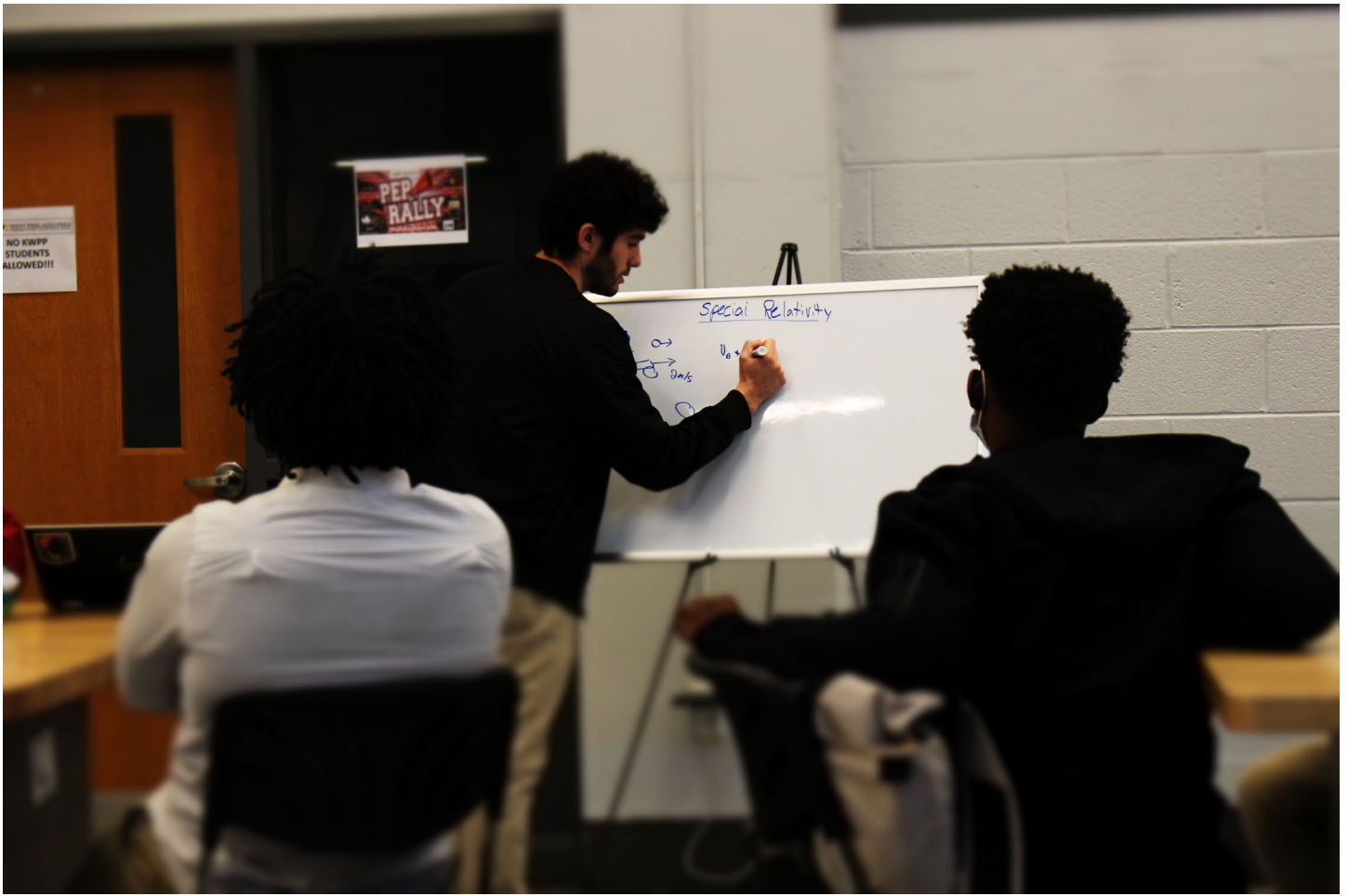
The SPS future faces of physics team (from left to right: photographer Nell Grabowski, presenter and event organizer Joe Popp, presenter Deryk McGarry, presenter and SPS Treasurer Calvin Huisentruit, timekeeper and SPS President Shayna Sit, presenter Julia Oseka)



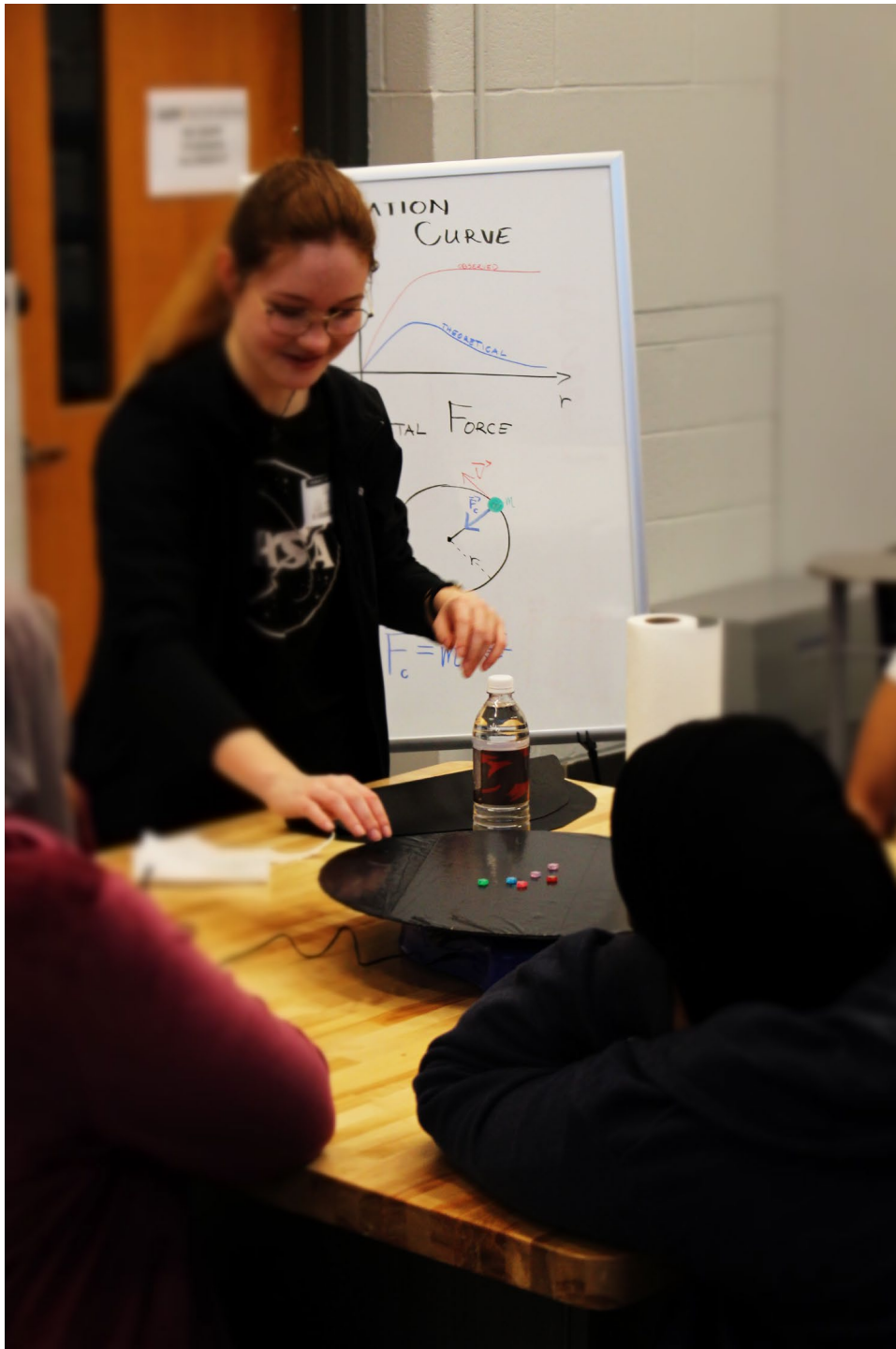
SPS Treasurer Calvin Huisentruit presenting on the doppler effect and how this is used to determine the expansion of the universe.



Deryk McGarry presenting on Newton's second law and how it can be used to understand the life cycle of a star.



Event organizer Joe Popp presenting on the effects of Special Relativity and Einstein's postulates.



Julia Oseka presenting on centripetal forces and how it is used to determine the existence of dark matter.



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If you have any questions, please contact the SPS National Office Staff
Tel: (301) 209-3007; Fax: (301) 209-0839; E-mail: sps-programs@aip.org