



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Future Faces of Physics Award Report

Project Proposal Title	The Future Faces of Physics: The FUNdamentals
Name of School	University of the Sciences in Philadelphia
SPS Chapter Number	5619
Project Lead (name and email address)	Katee O'Malley komalley@mail.usciences.edu
Total Amount Received from SPS	\$499.27
Total Amount Expended from SPS	[Should be \$500.00 or less.]

### Summary of Award Activity

Students from the University of the Sciences visited West Catholic High School in Philadelphia, PA and performed many interactive, enjoyable, and influential demonstrations to freshman and sophomore students. The demographics of students at West Catholic High School included many that are underrepresented in physics. There were six stations set up, each with an underlying physics theme; *The Phases of Matter I & II*, *Waves*, *Thermodynamics*, *Optics*, and *Electricity*. Each station had 1-5 demonstrations that displayed various physics concepts according to their underlying theme. The high school students rotated through the stations with admiration for the physics they were observing. The students were very impressed by the physics behind the demonstrations and they expressed much interest in a future in physics.

## Statement of Activity

### Overview of Award Activity

- **Brief description:** The project was a physics demonstration day where students from University of the Sciences visited a local high school in the community that had underrepresented groups in physics. There were five stations set up, including *The Phases of Matter I & II*, *Thermodynamics*, *Waves*, *Optics*, and *Electricity*. Specific demonstrations included Bernoulli's floating ball, cartesian divers, non-Newtonian fluid, liquid nitrogen, chladni plates, ice melting blocks with an infrared thermometer, Einstein's mask, an infinity mirror, light diffraction glasses, and a Van der Graff generator.
- **Outcomes** –The project was able to promote an interest in physics among students who are generally underrepresented in physics. The project was able to excite students about learning and let them connect the material they learned in class with inspiring experiments. The high school students were able to interact with undergraduate students in a physics program and ask them questions about pursuing a career in physics.
- **Audience** –The target audience was for high school students, specifically freshman and sophomore. The demonstrations were done for two classes, about 15-20 students in each class. The students that attend West Catholic High School primarily belonged to groups that were underrepresented within the physics community.
- **Context of the Project** –This was the first outreach event done by USciences's Society of Physics students. It was able to engage our students to share their passions for physics with younger members of the community. Following this outreach event was the department and SPS's participation in Philadelphia's Science Festival. This project is the start to many more SPS outreach events.
- **Highlights and stories** – On the survey filled out as part of the assessment plan, some students wrote,
  - "I want to become an engineer, this made me more intrigued" -9th grade student
  - "Yes, [I was swayed], because the experiments were amazing" -10th grade student
  - "[The demonstrations] made me want to try [and pursue science]" -10th grade student
  - "Today reignited my previously dying interest [in physics]" -10th grade student
  - "Today made my science experience way better and made me interested even more." -10th grade student

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

Our goals for this project included:

- Impact the morale and spirit of the growing physics major population
- Target about 50-75 students
- Visit a school with a high minority percentage
- Gain plans to return to the same school for more outreach
- Invite students to our University to show them the academic side of pursuing physics

In order to evaluate our program, we provided a survey to the students during the event and asked that they fill it out before they left that class period. As an incentive, we provided each student with a USciences drawstring bag, provided by our marketing department, if they returned the survey. We received a majority of them back, some were filled out better than others, but it gave us a sufficient evaluation of the student's learning experience. In addition, close communication between USciences and the high school helped to get the teacher's perspective on how the event went.

According to the surveys, every student enjoyed the event in some aspect. We received a total of 26 evaluations back, and about 40 students participated. We asked the students their favorite demonstrations and most of them thought the liquid nitrogen (8/26 students) and the Van der Graff generator (9/26 students), was

their favorite. The diversity of our experiments enabled each student to get involved with a physics topic that interested them. We now know for this age group, to gear our experiments to hands on demonstrations.

We asked the students their interest in pursuing science, including physics, after high school on a scale of 1 to 10. For interest specifically in physics, most students ranked it a 7,8,9, and 10 with majority of the students choosing 10. For interest in science in general, students ranked that 8,9, and 10 with most being a 10 as well. The most outstanding result was when we asked if our demonstration day influenced their interest to go into physics and out of the students that answered the question, ninety-five percent said yes.

After talking with the teacher that coordinated the event with us, he said the students didn't want us to leave and wanted to continue learning about the physics and seeing the demonstrations. His suggestions were to have the event earlier in the year and have us at more class levels and have the demonstrations for more classes. We have already discussed returning next semester. On the survey, the students suggested having more time for each demo, having some of the volunteers being more enthusiastic, but overall change nothing because it went great.

After collecting emails of interested students and keeping in touch with the school, we are looking forward to inviting the high school students to our campus in the fall.

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

This project greatly impacted our chapter of SPS here at USciences. The high school students did gain a lot from this project, but our students gained a lot as well. One member shared that he didn't think he would enjoy teaching the high school students about physics as much as he did, and others mentioned how happy they were that they volunteered. It isn't always easy to get our students involved but I really think that this project is the start to a really great chapter of SPS. This project also helped a lot of our members get closer, it was not an event for one person to single handed put on it required teamwork. The students at USciences were extremely helpful when it came to working as a team and everyone made sure that they contributed their best to this event.

With respect to this event, our chapter received an award from the University of the Sciences. The title of the award is the Martin Luther King Jr. Service Award. This award is presented to an organization who shows initiative in bridging the gap of diversity, leadership, courage, commitment, sacrifice, and service. This award was an honor to our chapter. This award helped us to get recognized on campus and improve the morale of our organization.

## 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><b>We attended a school with majority of the students being African American, a commonly underrepresented minority in physics. In addition, there were a lot of female students, also an underrepresented minority in physics.</b></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><b>Approximately twenty high school freshman and twenty high school sophomores participated in the outreach event.</b></p>
<p>How many students from your SPS chapter were involved in the activity, and in what capacity?</p>	<p><b>8 USciences Students volunteered for the event and explained the demonstrations they were assigned. Volunteers were active in learning the physics behind the demonstrations, preparing for the event, helping with driving to the school, and explaining the demonstrations to the high school students</b></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><b>Yes, the funds were sufficient. If more funds were granted, they would be used for more demonstrations to bring a greater variety to the high school.</b></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><b>Yes, we want to do a similar event next semester and have already talked with the teacher in charge at the highschool in planning the next event. In addition, we want students from the high school to visit USciences to see the physics department here at our school.</b></p>
<p>What new relationships did you build through this project?</p>	<p><b>This project provided us with the contact with a local side which will benefit both the university and the high school.</b></p>
<p>If you were to do your project again, what would you do differently?</p>	<p><b>If this project were to be done again I think more efficient planning would be needed, the date and time of our event kept getting switched around. We would also request a longer amount of time with the high school students so they can not feel rushed at each station and be more hands on. Also, doing the project earlier in the year which would be better for the high school students.</b></p>

## Press Coverage (if applicable)

<http://www.usciences.edu/newsevents/newsdetails.aspx?Channel=%2fChannels%2fAdmissions%2fAdmissions+Content&WorkflowItemID=a0e55cdd-b2e8-4191-96f5-f07b6452fe6a>

## Expenditures

Funds were mainly provided by the SPS award received, with overflow covered by our chapter of SPS here at University of the Sciences. The funds were used for purchasing different items for the demonstrations used during our visit at the high school. Some of the funds were used for organization of the events, including things like titles for each station and nametags for the volunteers. Copies of the survey were provided by University of the Science's Student Government Association.

### Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Cartesian Diver Kit	Demonstrated Pressure and Bouyency	\$31.75
Van Der Graff Generator	Demonstrated Electricty	\$149.90
Infrared Thermometer	Went along with the ice melting blocks for demosntrating thermodynamics	\$30.35
Diffraction Glasses	Demonstrated Light and Optics	\$77.33
Ice Melting Blocks	Demonstrated Thermodynamics	\$22.13
Water	Used to make Oobleck and for clean up	\$4.18
Name Tags	Worn by the students of Usciences to be identifiyable	\$3.23
White Poster Board	Used to make titles for each demosntration station	\$6.35
Flowers	Used to Dip in Liquid Nitrogen	\$14.07
Balloons	Used to Dip in Liquid Nitrogen	\$9.90
Aluminum Pie Plates	Used in the Van Der Graff generator in demonstrating Electricity	\$15.99
Sympathetic Tuning Forks	Used in the Waves demonstration	\$50.00
Hand Crank Generator(2)		\$60.00
Stainless Steel Bowl		\$25.00
<b>Total of Expenses</b>		<b>\$500.18</b>

## Activity Photos

All Photos below are credited to Dr. Roberto Ramos, Advisor of SPS at University of the Sciences.



Members of SPS on the outreach site holding some components of the demonstrations and holding up the “right hand rule”



SPS member, Katee O'Malley, explaining how the demonstrations will run and the evaluation survey



SPS member, Oberon Wackwitz, demonstrating the Phases of Matter using a green non-Newtonian fluid, Oobleck



SPS member, Kacy Catalano, demonstrating Light & Optics using diffraction glasses



SPS member, Oberon Wackwitz, demonstrating Bernoulli's Principle



Students from West Catholic High School dipping balloons in liquid nitrogen



Students from West Catholic High School dipping flowers in liquid nitrogen



SPS Member, Caitlyn McConnell, demonstrating the different phases of matter by transforming the nitrogen gas in air of the balloon to a solid by dipping it in Liquid Nitrogen



Students from West Catholic High School holding flowers after they have been dipped in liquid nitrogen





SPS Member, Luke Conover, demonstrating electricity with the Van der Graph Generator



SPS Member, Kacy Catalano, getting ready to demonstrate his hair standing up with the Van der Graph Generator



SPS Member, Vincent Pham, demonstrating electricity with the Van der Graph Generator and having a very brave volunteer feel the static electricity for himself



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