

Marsh W. White Award Proposal

Project Proposal Title	The Sound of Science
Name of School	University of the Sciences in Philadelphia
SPS Chapter Number	5619
Total Amount Requested	\$500

Abstract

The University of the Sciences in Philadelphia chapter of SPS aims to provide the public examples of the wonders of auditory phenomena in today's world. We plan on demonstrating some principles of sound at the Philadelphia Science Festival. We want to help people understand how interesting sound can be.

Proposal Statement

Overview of Proposed Project/Activity/Event

We propose to participate in the 2021 Philadelphia Science Festival, to reach the widest audience we can. We would be set up at a booth, able to show off a fair amount of demonstrations of various sound-related principles. By doing so, we hope to shed some light on something that the general public generally takes for granted: sound. Many people of all ages come to the Philadelphia Science Festival, though we especially hope to reach younger audiences; inquisitive grade-schoolers, for example. As many of the members of the chapters are musically inclined, it was an easy decision to make. Something so important to so many people, music is only possible through the physics of sound--even further, we can even hear the 'sound' of cosmic background radiation with modern technology. From the strings on a guitar to the very universe itself, the importance of sound has reverberated through our community.

It is worth noting that the specific situation we find ourselves in is constantly changing and thus, we have to be ready to change along with the situation. We are focusing on things that are clear audio-visual demonstrations so that, if need be, we can plan to do virtual demonstrations if the situation calls for it.

How Proposed Activity Promotes Interest in Physics

Just as members of our chapter found solace in this project stemming from their love of music, we hope to strike a chord within the members of the public we interact with. By showing off devices and homemade instruments that illustrate the reasons why things sound the way they do, and how we use and interact with those sounds, we hope to isolate this general interest and point it towards the way of physics. Like EM radiation or gravity, sound is a common experience that the vast majority of humanity shares. Such a common thing, that can be grounded in simple physics principles, is a fantastic way to engage just about anyone we meet.

Plan for Carrying Out Proposed Project/Activity/Event

- Personnel - We currently have a committee of 4 students who are involved in planning and running this specific project
- Marketing - We will be at an open-air festival, with lots of foot traffic; reaching our audience shouldn't be an issue
- SPS member participation - In addition to our contingent of 4 committee members, we have several additional SPS members who are available to help run demonstrations the day of the festival
- Expertise - As mentioned, many members of our chapter are musically inclined and most of the committee members have covered the subject of sound in class; as such, we at the least have a basis for how our basic physics principles of sound impact things around us

Project/Activity/Event Timeline

The 2021 Philadelphia Science Festival is still tentatively scheduled, so there's not a precise date for it as of now. However, these are typically take place in mid-late April. As such, we are planning to have all of our demonstrations ready by the end of March. Ordering would take place as soon as we got word

whether we received the award or not. Then students would take turns testing/building demos as they come in. So, we would ideally have all our demos completed by March 31, and then the following week, we would do a practice 'dry run' of our setup to prepare for the science fair. In the event that the in-person festival is cancelled, this is when we would test out our virtual medium.

Activity Evaluation Plan

In addition to the direct feedback from participants, we would also like to log the number of participants we receive in a day. With an event as large as the Philadelphia Science Festival, there should be no shortage of participants. That being said, low participation would fall solely on our engagement, and couldn't be blamed on circumstances. So, it will be imperative that we keep track of the number of participants we're getting. That, coupled with direct feedback from the participants we do have, will allow us to adjust our actions to draw a wider audience. By keeping accurate records, we can make our project more successful on the day of; this should leave us with an accurate record of participants and their feedback. At the end of the day. The number of participants we draw and their satisfaction with our demonstrations will be how we measure our success in promoting interest in physics among the general public.

Budget Justification

Everything on the budget proposal will be used to create a new demonstration, either by themselves or utilising equipment that the department already has. For example, the helium and hexafluoride gas will be used to demonstrate the change in pitch based on the medium, and we will be using balloons to administer the gas itself. A set of tuning forks will be used to show examples of resonance. An electric doorbell will be used along with a vacuum chamber and pump the department has in order to show how sound needs a medium to travel, and thus cannot travel through a vacuum. The guitar tuners and strings will be used to construct an instrument of sorts, to show the 'beat' phenomena and serve as another example of resonance, and dissonance. Wine glasses will be used both to show resonance via acting as a glass dulcimer and by shattering with a high-amplitude tone. The dog whistle will be used as an example of ultrasonic noise, the transparent whistle in order to explain how such whistles work, and the slide whistle to show how pitch varies with the length of a column of air in a pipe. All of those will be used alongside musical instruments owned by students and other devices the chapter has access to in order to demonstrate the many facets of the physics of sound.