



Marsh W. White Award Proposal

Project Proposal Title	Scoping Out Astronomy!
Name of School	United States Air Force Academy
SPS Chapter Number	7502
Total Amount Requested	\$300.00

Abstract

USAFA cadets and SPS members currently host hundreds of young students per year at our observatory tours. We plan to significantly augment these tours by adding a station where students will build simple, personal telescopes from two convex lenses and a cardboard tube that they may keep at the end of the evening.

Proposal Statement

The entire Proposal Statement should be no more than 2 pages, and organized as follows.

Overview of Proposed Project/Activity/Event

The Air Force Academy currently hosts hundreds of elementary school students each year at our observatory tours and our “Physics is Phun” elementary student outreach shows. Using a previous donation we purchased many hundreds of Planisphere star finders to give to students to encourage their own explorations. We would like to take this a step further by giving them the means to enhance their naked eye observations after. Sometimes the weather is bad and the views through the telescopes are not as exciting as they could be – the addition of this component to the tour would easily make up for that. This project will teach students that physics and astronomy are accessible – they will be able to use a telescope they built themselves to look at the moon and stars. This will inspire them and fuel their curiosity about physics and the natural world. They will be able to keep their telescopes as a lasting and tangible tool for amateur observation and educational inspiration.

The project is feasible as it builds upon our already highly successful observatory tours and Physics is Phun shows. We have ample student and faculty participation to assist the elementary school students in fabrication of their telescopes. One of the lead faculty members has successfully carried out this project in the past with groups of thirty students. On nights of good seeing this project complements our existing telescope demonstrations at the observatory where we show off the night sky with three eight inch portable telescopes, our twenty-four inch research telescope, constellation tours, and a classroom portion.

How Proposed Activity Promotes Interest in Physics

Interest in physics will be generated by giving students hands-on experience building a rudimentary device that can be used to observe the night sky. Additionally, the telescope would be something the student can take back and share with friends and family, hopefully explaining how the device works. This will increase our impact with the local community and encourage students to pursue STEM fields in the future.

Plan for Carrying Out Proposed Project/Activity/Event

The framework for this project is already in place with our existing observatory tours and Physics is Phun shows. It will be simple to add this project as a new component of the tour. Tour groups are approximately 10-30 young students along with some parents with an average of 5-10 cadets and faculty members leading the tours. The Cadet-in-Charge of the Physics and Astronomy Club (and SPS Chapter President) will be in charge of planning and leading the event in conjunction with the Officer in Charge of the Physics and Astronomy Club (and Observatory Director). Given that we already have tours scheduled for next semester increased marketing will not be necessary. We already have lasting relationships with local school districts. At each tour there will be at least five cadets and department of physics faculty members helping lead the tour and build the telescopes. If necessary, we can easily draw extra volunteers from the STEM club given the fact that cadets are eager to help with these events.

Major Matthew Spidell has successfully built these telescopes with groups of thirty elementary school children. His expertise will ensure that all helping cadets and faculty members are experts in telescope construction and that the project will be a success.

Our construction plan, modified from Home Science Tools:

[Make a Simple Telescope](#)

Materials:

- Two lenses with different focal lengths (We will use **300 mm** and **50 mm** double convex lenses.)
- Paper towel roll (we will ask students to collect and bring these and we will have our own as well)
- 1 piece of paper or cardstock (we will provide)
- Hot glue (we will provide)
- Craft foam (we will provide)

Procedure:

1. Roll up the sheet of paper or cardstock the long way to form a tube that fits into the end of the paper towel roll (this will be allowed to slide back and forth within the paper towel roll and act as a focusing tube). Cut a ring of craft foam with an outer diameter equal to the size of the cardstock tube and an inner diameter the size of the 50mm focal length lens. Hot glue the lens into the craft foam ring and hot glue the craft foam ring into the end of the cardstock focusing tube. This will be the eyepiece.
2. Now cut a ring of craft foam for the second lens with the outer diameter equal to the paper towel roll and the inner diameter equal to the size of the second lens. Hot glue the lens inside the craft foam ring and hot glue the ring inside the opposite end of the paper towel roll.
3. Take a marker and write on the side of the tube “DANGER! Never point this telescope at the sun!” Now the telescope is ready to be used!
4. Look through the eyepiece and point the other end of your telescope at a distant object. Slide the two tubes in and out until the object comes into focus. You will see the image upside down and magnified.
5. Teach the students all about lenses, refractive telescopes, and astronomy!



How the final product will look! (from life.illinois.edu)

Project/Activity/Event Timeline

14 January 2013 – all necessary materials have been purchased and February and March tour dates have been finalized.

1 March 2013 – all April tour dates have been finalized.

1 May 2013 – approximately 100 young students have learned and been inspired by building telescopes during our observatory tours.

Activity Evaluation Plan

In order to measure success we will record attendance of young students, their parents, cadets, and faculty members. We will solicit feedback from the students and their parents. We will solicit feedback from Major Matthew Spidell given that he has successfully led this project in the past. We will also take pictures to document the tours and the telescope building project.

Budget Justification

Part requirements:

- 1) 100 30cm focal length lenses at \$1.40 each (\$140 total) nasco part #:SB10480M
- 2) 100 5cm focal length lenses at \$1.35 each (\$135 total) nasco part #: SB10476M
- 3) craft foam (\$15 total)
- 4) hot glue (\$10 total)
- 5) cardstock (we will provide)
- 6) cardboard tubes (we will provide along with students)
- 7) glue guns (we will provide)
- 8) scissors (we will provide)

Total: \$300.00

Here are some pictures from last year's observatory tours.
We really think we can make this a big success!



Using and learning about the main research telescope!



The classroom portion of the tour...telescope building will go perfectly with this!



Learning the constellations on the observatory roof!



Viewing the night sky through one of our portable outreach telescopes!