

College of William and Mary

Williamsburg, VA

Society of Physics Students

Demos in the Sun

Marsh W. White Award Final Report

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Introduction

Outreach of all kinds is a major focus of The College of William and Mary's chapter of the Society of Physics Students. While we already annually host PhysicsFest, our highly successful Physics Department open house aimed at the Williamsburg community (particularly local K-12 students), we wanted to create an event specifically catered to the College community itself. With that in mind, we used our Marsh W. White Award to create Demos in the Sun, the first annual day-long physics demo event held this year on April 7, 2013, at the Crim Dell Meadow, a central location on campus.

Event

We wanted demos and activities that would appeal to college students of all fields, so we could gather attention and then share our enthusiasm and passion for physics with people who wouldn't typically attend a physics outreach event. With this in mind, our anchor demonstration was making **liquid nitrogen ice cream** (our chapter's signature demo by this point). As it was the first nice, sunny day in a long while, this proved exceedingly popular and ensured we had a constant crowd at the event.

Once lured in with liquid nitrogen ice cream, we had three other main attractions: **oobleck**, a **liquid nitrogen "magic" show**, and both a full-scale **trebuchet** and our cardboard **prototype**. We also had a paper airplane construction station, although guests were more interested in the more unusual activities.

The oobleck station featured a large aluminum container of the non-Newtonian fluid, which guests were invited to play with to their heart's content and strongly encouraged to smack with an aluminum baseball bat or the palm of their hand, then gently submerge their hand in to experience its abnormal properties. They were also encouraged to pick up a chunk of it and note how it remained a somewhat chalky-feeling solid when kneaded, but reverted to a liquid-like pool when left resting in their hands that flowed out back into the container. As a Holi event was also taking place that day and many who participated in Holi then came to our event (a lucky fluke of scheduling), we were able to create some impromptu "science art" with the colorful chalk handprints guests left on the oobleck's surface.

The liquid nitrogen "magic" show turned waiting in a long line for liquid nitrogen ice cream into being in an interactive audience. Tim Milbourne, our personal Bill Nye the Science Guy, entertained and educated guests about the effects of liquid nitrogen on objects such as bananas, balloons, flowers, and bouncy racquet balls, asking the crowd to hypothesize on what would happen to each object. The balloons in particular were a hit, as we asked the crowd to estimate how many balloons could fit in a small container of liquid nitrogen and what the liquid nitrogen would do to the balloons to begin with, which was met with a variety of answers (while many correctly hypothesized they would deflate then re-inflate as they warmed up, we did get a few guesses that they would change color or immediately pop; in both cases, we showed the guests

what actually happened and then explained why, and if an incorrect hypothesis had been offered we explained why that particular thing did not take place). This show also involved a lot of smashing things (mostly fruit and flowers), so of course it was a hit with college kids stressed out by working on midterms and term papers!

Our final demo was that of our trebuchet, which had been a long-term project of our chapter for the latter half of the spring semester. We designed and built the trebuchet from start to finish, first creating a small-scale test trebuchet out of cardboard and then constructing a full-scale one out of wood. Both were present at Demos in the Sun; guests were invited to fire and experiment with the prototype, but we kept operation of the full-scale trebuchet to chapter members for safety purposes. For the full trebuchet we demonstrated its accuracy and reliability to mixed results, but we also constantly worked throughout the day to troubleshoot and modify the trebuchet for optimal functionality. In other words, guests could both watch us properly use the trebuchet and constantly modify it, and in some cases were invited to offer suggestions for how to improve the design! It served as a way to get non-physics students involved in a physics construction project.

One other event in our Marsh W. White Award proposal that is still in its formation process is our plan to launch a griffin into space- or, rather, send a plush version of our College's mascot up in a weather balloon with a GPS tracker. We were going to do this with Demos in the Sun but were unable to get the required approval in time. We intend to continue working on getting approval for this event over the summer and to launch the griffin in the fall semester in an event associated with PhysicsFest.

Demos in the Sun drew in a large crowd of college students, Williamsburg citizens and tourists alike, many of whom had little to no prior interest in physics. Through a combination of interesting, interactive demos and a dedicated and enthusiastic team of SPS members we created a new annual spring outreach event that perfectly complements our fall open house and enables us to do what we really love doing; sharing our love of physics with anyone who'll listen to us. Demos in the Sun will only grow as an event from this point on, but starting it wouldn't have been possible without the Marsh W. White Award.

Budget

\$142.38	Liquid Nitrogen Ice Cream Supplies (Milk, sugar, half-and-half, etc.)
\$3.65	Gravel
\$9.46	Rope (for trebuchet)
\$9.54	Beanbags (for trebuchet)
\$6.70	Cornstarch (for oobleck)
\$15.16	Alka Seltzer and balloons (for Alka Seltzer submarine competition)
\$5.63	Paper and paperclips (for paper airplane competition)
\$10.00	Soda
\$202.52	TOTAL
\$97.48	Excess – to be used for edge-of-space balloon next fall

Photos



Tom Lever, Ashna Aggarwal, Emma Pierce, and Rachel Hyneman prepare liquid nitrogen ice cream.



Deborah Wood (attendee) volunteers to whack the oobleck with a bat.



A crowd of students gathers for Demos in the Sun.



William Bergan (Treasurer), Reed Beverstock (Chairman of Projects), and attendee prepare the trebuchet for a launch.



Tim Milbourne gives an impromptu liquid nitrogen demo to waiting students.

All photos taken by Joshua Hill.