

Activity: Demos in the Sun: The Oobleck Experience

SPS Chapter: College of William and Mary SPS

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Amount Requested: \$200

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Demos in the Sun is a yearly event in which SPS performs outdoor physics demonstrations for the general college community. In other outreach events, we have featured an extremely popular demonstration in which students run across a pool of oobleck, a non-Newtonian fluid made of cornstarch and water; however, we have found the pool to be too small. We would like to create a larger pool for use in this demonstration, both at Demos in the Sun and at other outreach events.

Each year, the William and Mary physics department has organized PhysicsFest, an outreach event that attracts several hundred people, primarily aimed at middle and elementary school students. PhysicsFest consists of a variety of stations showcasing various physical phenomena as well as a demo show held in one of the lecture halls. One extremely popular demonstration from PhysicsFest is the oobleck pool. Oobleck is a non-Newtonian fluid made from cornstarch and water with an exciting property: when gently disturbed, it acts like a liquid, but when struck forcefully, it acts like a solid. This property enables the ability to “walk on a liquid” by quickly running across a pool of oobleck.

Although PhysicsFest is primarily aimed at middle and elementary school students, many of the showcased demonstrations are also appropriate for an older audience. Therefore, SPS additionally hosts Demos in the Sun, an annual event held in the spring open to students of the college in which we share the joys of physics with our fellow students. Typically, all demonstrations are performed outside, allowing the use of messy demonstrations, such as Diet Coke and Mentos. This event has proved popular among students at the school, both inside and outside of the physics department.

In previous years, we have utilized an oobleck pool demonstration at PhysicsFest and Demos in the Sun, in which we fill a baby pool with oobleck and allow attendees to run across it and play in it, demonstrating the unique properties of non-Newtonian fluids. This has been extremely successful in the past, among both young and old; however, because the baby pool used is small, the demonstration has not been as effective as it could be. Additionally, the baby pool is very fragile, causing it to frequently break. In order to correct these flaws, we would like to construct a custom baby pool for filling with oobleck for use during PhysicsFest and Demos in the Sun. The pool would be constructed primarily from wood and a tarp. An 8' x 2' x 1' hollow frame would be created from 1" thick oak wood, a CAD drawing of which appears below. The sides would be held together using two right-angle brackets per corner, as well as a diagonal bar of wood inside each corner for support. In order to contain the oobleck, a tarp would be

placed across the frame and held down by the weight of the frame and oobleck. A bottom, constructed from plywood, would be included to prevent the tarp from falling through the bottom when transporting the pool. Additionally, pool noodles would be cut and placed on all edges and corners to prevent possible injuries. A 6' x 2' x 1' pine prototype of this pool was used at Physicsfest this year, and was quite successful. We learned that pine is not strong enough to survive the combined weight of the oobleck and the people running across it; near the end of the event, a piece of wood began to splinter and crack. Oak, being sturdier than pine, would help prevent this in the future. Additionally, we learned the necessity of including a board across the bottom of the pool in order to more easily move the system without spilling oobleck.



This is a CAD drawing of the oobleck pool. A tarp would line the inside of the pool in order to hold the oobleck, and the edges of the tarp would be pinned beneath the pool.

Additionally, in order to use this pool, cornstarch is required. In order to create enough oobleck to fill the pool to a height of 8", 250 lb of cornstarch is required per event.

In order to create this project, we intend to work on the pool during regularly scheduled meetings. This would be the main project worked on next semester during our frequent “build days.” We have access to all of the tools necessary for the creation of the pool, and there are eight to ten students interested in its creation, some with experience in woodworking, providing ample assistance for the construction.

The oobleck pool has proven to be a very successful demonstration for people of all ages, and we hope to improve it even more for future years. The event is a main attraction at PhysicsFest and has entertained many throughout its use. Many children come to the pool, play in it, and then begin to ask questions about how it works, leading to an excellent opportunity to inspire young people with physics. The creation of the durable, long-lasting pool we have proposed will enable our chapter to devote more resources towards other demos, rather than frequently replacing the baby pool.

In order to successfully run this event, we estimate that we will need \$330. The planned expenditures consist of:

The Oobleck Experience	
Oak wood boards for frame	\$150
Plywood bottom	\$20
Cross bars	\$5
Right-angle brackets	\$25
Screws	\$5
Tarp	\$25
Cornstarch	\$100
TOTAL	\$330

We plan on being able to obtain \$130 for the right-angle brackets and cornstarch from current club funds and fundraisers, and we have access to pool noodles; therefore, we would like to be able to obtain \$200 from the Marsh W. White award. Thank you!