

To:
Society of Physics Students
Blake Lilly Prize Committee
One Physics Ellipse
College Park, MD 20740-3843

To Whom It May Concern:

My name is Nabil Iqbal, I am the Outreach Coordinator for the Cornell University chapter of SPS. Enclosed is our submission for the Blake Lilly Prize; I am sorry about the slight delay and I hope this does not affect your judgment too adversely.

Thanks very much,



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Cornell SPS Outreach and the Philosophy of Science

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I have been involved with the Cornell chapter of SPS outreach program for about two years now; I can honestly say that it has been one of the most rewarding experiences of my Cornell career. We do a wide variety of activities, ranging from sequences of weekly expeditions to local elementary and middle schools to one-shot activities at nearby shopping malls. We've covered a dramatic range of topics in Physics and science in general, from circuits and electricity to water-propelled rockets to Vitamin C.



But despite this range of activities, there are some experiences that stand out in my mind. For example, one of our favorite activities involves having children build a motor from scratch; it takes about ten minutes for them to wind their own eight-turn coil and assemble everything themselves, using a magnet and a somewhat rickety construction involving paperclips and a copious amount of electrical tape. I always love the expression on the kids' faces when they finally put it all together and the little coil of wire actually *spins!* The combination of wonder (why is it spinning?) and pride (*I made it spin!*) that I see in them always gives me a feeling that can really only be described as warm and fuzzy.

Another experience that I remember took place just a couple of weeks ago. We visited an elementary school and did a program on the science of soap bubbles, intending to introduce the students to the ideas of surface tension. We started by simply handing out some simple props (which included some pieces of string) and bubble solution and challenging them to make the biggest bubble they could. They obliged; spontaneously deciding to work together, they tied all of their pieces of string together to make an enormous loop and then used it to blow the largest bubbles that I have ever seen. I would estimate them to be at least three feet in diameter; they were far too large to be spherical and would wobble and undulate across the room. Whenever they finally popped, everyone nearby would be drenched in bubble solution. I had no idea that the interplay of surface tension and air pressure actually *allowed* the creation of bubbles with such a ridiculously large radius.



We all had a great time.

We often like to think that during outreach we actually teach children some science that they will remember and take home with them. I think the point that these experiences highlight, however, is that the important thing during these activities is *not* that the children truly learn about surface tension or about Faraday's law. What *is* important is that the children learn something about the *philosophy* of science. Science has two very important characteristics that are generally (in my experience) *not* learned in class:

1. It is *real*; a concept such as Newton's third law takes on a whole new meaning when a student actually sees it dramatically propel a water-powered rocket through the air, drenching everyone.
2. It is *fun*. Really, kids. It is. This is a dimension that is often missing and yet always vital for the education of a budding scientist.



So in the end, I don't really care *that* much whether the children actually remember what Newton's third law is or what Faraday's law meant. What is important to me is that the kids remember that when they did Science with the Cornell people, they had a great time. They blew something up (in an entirely controlled and safe way, of course). They froze bananas and smashed them. They saw the individual colors that make up light. They splashed around with Oobleck and made their own silly putty.

They blew larger bubbles than they ever thought possible. They saw the air ripped apart into glowing purple plasma (inside a plasma ball). They ate ice-cream made from liquid nitrogen. They heard a lot of long words and explanations, and perhaps they even remembered some of them; but if not, it's really no big deal.

The important thing is that they remember that science is *fun*.

There's really enough time to learn the details later.