

## **Texas State University Marsh White Outreach Award Report 2010**

The 2010 Marsh White Outreach Award helped fund a physics camp for 9 to 12 year olds. There were 36 kids in our physics camp, which lasted for 5 days from June 21-25, and ran from 10am to 3pm each day. The Marsh White Award went towards supplies for hands-on activities and demonstrations that helped the kids explore different physical laws and concepts over the course of the week.

On the first day, we explored electricity and magnetism. Then, we challenged them, with very little direction, to use what they just learned to make their own individual light bulb circuits with an assortment of batteries and wires we gave them. It was impressive when some of the kids figured out, on their own, that they could dim the light bulb by changing the circuit from series to parallel. We did a bunch of demonstrations that day with a Van de Graff generator and some electromagnets, and we gave the kids a bunch of magnets to take home.

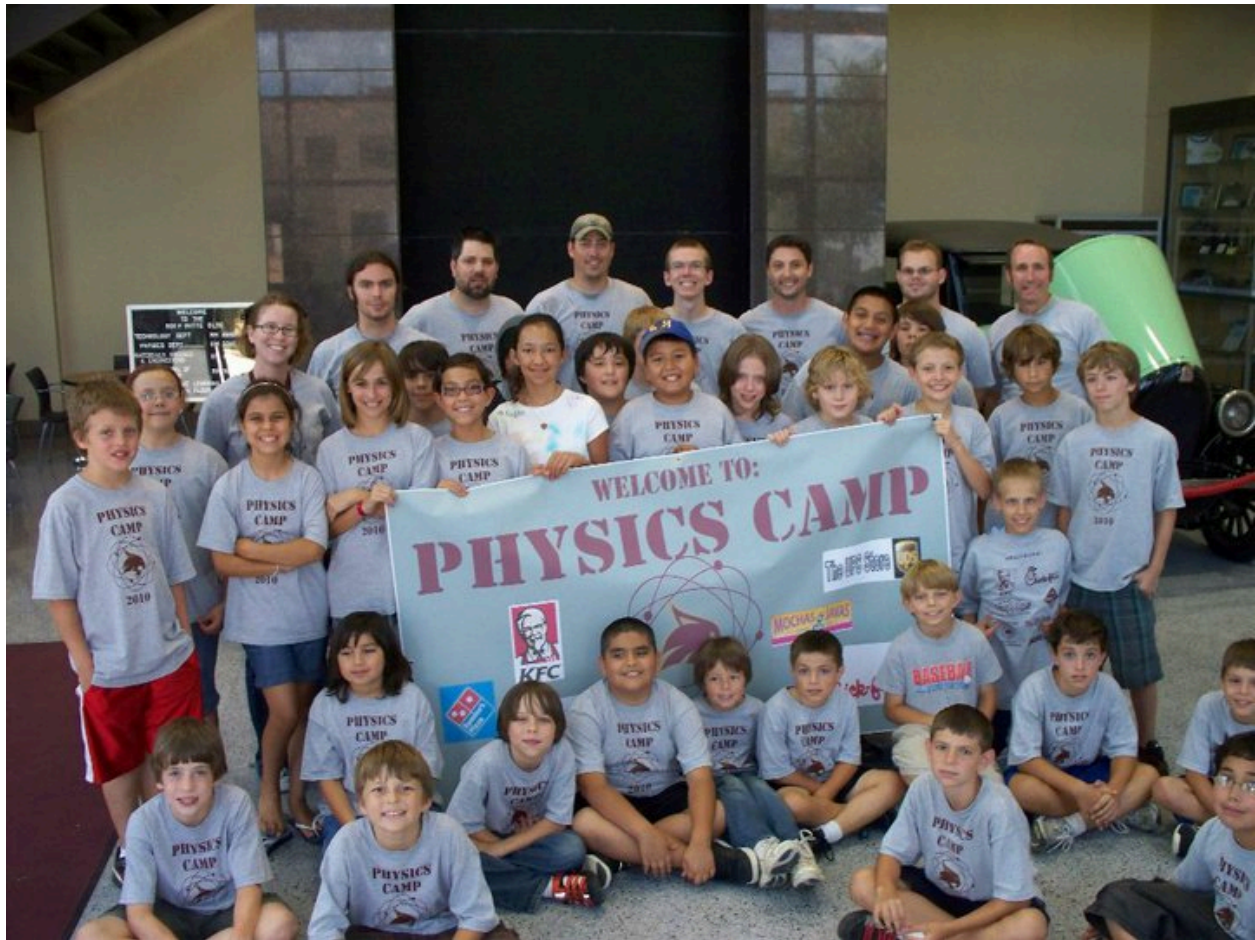
On the second day, we explored light and sound waves. There were many small demonstrations this day dealing with colors, resonance, reflection, refraction, Doppler effect, etc. However, the kids seemed to enjoy the more interactive stuff. They really liked playing with the diffraction gratings and lenses we gave them. They loved the race where the kids lined up and had a "wave" perpetuate through them in the form of a beach ball, counting to 10, doing a jumping jack, etc. We ended this day with a game where the camp counselors were electrons orbiting a tree posing as the nucleus. We asked each kid a question about something we talked about in the last 2 days. If they got it right, we gave them a water balloon, which we called photons. Their job was to knock the "electrons" out of orbit by hitting them. If the electrons caught the photon, they could emit that photon back at the campers.

On the third day, we did forces, friction, and started pressure. The main activity we did that day was we let the kids make their own walk along gliders out of newspaper. We had already made the templates for the gliders, but the kids had to adjust them for flight. We showed them how speed, air pressure, air resistance, etc. are all important factors when it comes to flight. We used a smoke machine to help demonstrate how air flows around their gliders, and how changes in pressure affect its flight.

On the fourth day, we finished exploring pressure and buoyancy. We started the day with some very impressive demonstrations. The kids liked watching the vacuum cannon we made out of PVC pipe. We destroyed some coke cans by launching ping-pong balls with our cannon. We also did a demo where we poured a pot of boiling water into a pot of liquid nitrogen. The last half of the day, we talked about buoyancy and we devised a cool experiment disguised as a competition. The kids were to try to make a tin foil boat that would hold the most amount of marbles. We let them talk about and design it first, and then we gave each team 1 sq. ft. of tin foil. A couple teams made boats that looked like speed boats, and did not do very well. One team actually cut off part of their tin foil and made buoys out of them, which was impressive, but it still did not win. The winning team curved their tin foil into one giant dome shape. We talked about why that shape worked the best.

On the last day, we learned about space and rockets. We hired a traveling planetarium, and the kids loved that. We also had our own Ava Pope present her research that she did with Dr. Olson here at Texas State. She talked about using “forensic astronomy” to decipher when and where old Van Gogh and Edvard Munch paintings were painted. After that, each camper made and personalized a bottle rocket. At the very end of camp, we launched the rockets using vinegar, baking soda, and a cork. We got them to think about the pressure build-up inside the bottle that eventually forced the cork out, and then force on the bottle once the pressure escaped.

Here are a few pictures of physics camp 2010:



All of the campers and counselors who made Physics Camp possible.



Demonstrating Bernoulli's Principle with an air blower.



A camper uses a Van de Graaf generator to make his hair stand up.





The campers watch the results of mixing liquid nitrogen with boiling water.



The campers were eager to launch their baking soda and vinegar bottle rockets.