Marsh White Award Report

May 2013, The University of Texas at Dallas chapter of SPS

Figure 1. The launching of a rocket on the day of the event.

Our outreach event at The University of Texas at Dallas, a Rocket Competition: Physicists vs. Engineers, was a blast. University students built rockets that were launched from an open field on campus. Members of the surrounding community came out with their kids, observed the competition and learned about rocketry.

As far as events go, this rocket competition turned out to be more complex than any other that we've done. There were some unforeseen scheduling issues. Shortly before the launch event, the administration forced a change of location for our event. The new location was not easily accessible and emails had to be sent out to inform people of the new location. The flyers that had been posted earlier all had the wrong location. There were also some university rules and regulations that added unforeseen cost to the event, specifically insurance. Our initial plan was to have the launch event off campus in a park that allowed rocket launches. It was decided that the launch would be better accommodating to involved students with an on-campus launch event. With a campus launch, insurance had to be purchased. The type of insurance needed was changed at the last minute by the university administration to a more expensive policy.

The university is located in a largely residential area. This provided us with a great opportunity to engage people in the community with the wonders of rocketry. We had parents and kids come out to the launch event. Some of the kids helped with the launch which amounted to a countdown sequence followed by the push of a button on the launch controller.

There were two parts to this event. One part was an instructional lecture on rocketry that highlighted rules of the competition as well as rocket design. This was held in the spacious TI conference center on the UTD campus. We were helped with some of the finer details of rocketry by Dr. Philip Anderson from UTD's Center for Space Sciences. Dr. Anderson has a rocketry license and was an extremely helpful resource. He lectured on the principles of rocketry and gave insider pointers on how to optimize rocket design. At this meeting, materials were

Figure 2. Dr. Phil Anderson speaks in the TI Auditorium on the details of rocketry.

handed out to those that wanted to participate. The local mechanical engineers club was challenged to come, and contributed two teams. The physicists came in force--undergraduates, graduate students, and postdoctoral scholars--with nearly 20 at the informational meeting. The event was capped by pizza in the atrium, where participants mingled and sized up their fellow competition.

Disassembled rocket kits were provided to the participants, teams of 2 or 3 students. To assist students in constructing the rockets, building supplies were provided in the SPS lounge for everyone to use. In particular, various glues and epoxies were provided to connect the components of the rockets.

The second part of the event was the launch of the rockets. Prior to the event itself, UTD SPS mentor Professor Jason Slinker joined Professor Anderson in testing launches at the site to ensure successful launch was possible. We experienced high winds on launch day. This unfortunate weather prevented us from using the class E engines, which Anderson and Slinker demonstrated could reach approximately 900 feet with payload. Instead, lower rated class D engines were used with a considerably lower maximum altitude. Even with smaller engines, the high winds carried the rockets a considerable distance down the field, so this reduction of engine sized proved wise. During the launch event, Dr. Anderson graciously allowed the use of some of his equipment, such as a launch pad and electronic altimeter.

Adhering to rules for national competitions, the rocket event morphed into an egg lofting altitude competition. The design criteria involved carrying an egg in an enclosed payload of the rocket. The ultimate goal was to see who could get the delicate egg the highest and returned to Earth without breaking. Rules for this competition were adapted from the national Association of Rocketry website at

Figure 3. The winning launch team.

Figure 4. A young community member assists with the launch of a rocket.

http://nar.org/pinkbook/26_ELA.html. After each launch, the payload was opened in the presence of Dr. Anderson for the inspection of the egg and removal of the electronic altimeter. A second method of determining height was also employed. An "Alti Trak Altitude Finder," which is essentially a simple sextant, was used. With a known distance from the launch pad and the angle formed by line of sight to the apex of the rocket's trajectory, some trigonometry allowed for determining height. As the rockets reached apex, sighting the rocket in the scope was difficult. These measurements were deemed not as accurate as the electronic altimeter due to the blinding brightness of the sun. For those rockets that survived the launch, each rocket was launched twice. The winning rocket altitude was 383 feet.

The parents and kids from the surrounding community really made this a great event. This event was also covered in detail by the UTD News Center: http://www.utdallas.edu/news/2013/4/19-23231_Rocket-Contest-Competitors-Strive-for-Height-Cargo_article-wide.html. Thus our event reached a wide portion of the UT Dallas community and invigorated interest in physics and our local Society of Physics Students. This connection also led to the great photographs provided in this report. Hopefully the enthusiasm the kids showed from helping to launch the rockets will ignite their interest in science.

Figure 5. A rocket with laser etched fins showing the SPS spirit.

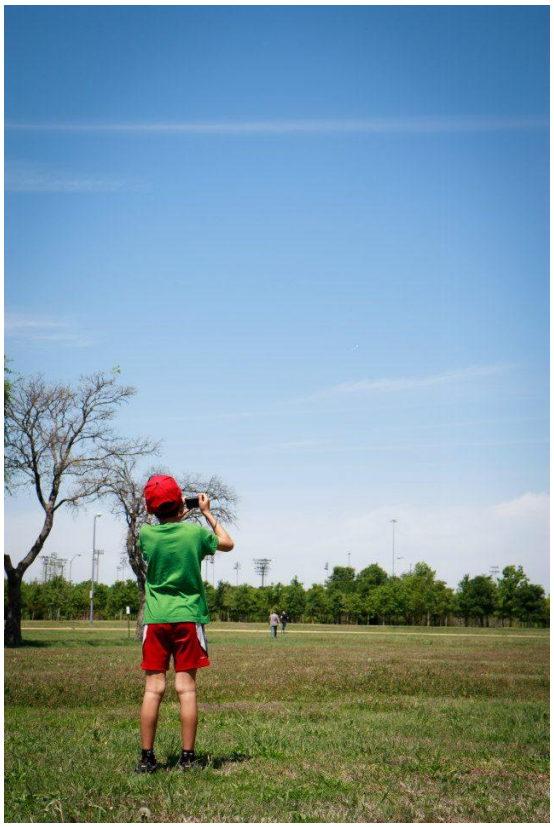
The event was supported by the Marsh White Award and by a gracious gift from the UT Dallas Physics Department.

Expense List

4 x Estes BT-60 Body Tube Pack	$26.01
32 x BT-60 Plywood Bulkhead Plate	$22.46
16 x Estes 24 inch Parachute	$24.53
16 x Estes 18 inch Parachute	$22.29
8 x Vaughn 3/16in Launch Lug 2.00in Long	$2.80
10 x Estes E12-4 Model Rocket Motor 3 Pack	$167.90
8 x Estes D & E Engine Mount Kit	$48.80
11 x 1/4in Elastic Shock Cord	$7.70
16 x Small 1/8in Screw Eye	$4.00
32 x BT-60 Body Tube or Staging Coupler	$48.00
11 x Small Kevlar Shock Cord	$12.10
6 x BT-60 Body Tube 18in Long	$13.80
School Insurance	$126.00
Pizza	$70.00
Printing	$12.94
Total	**$609.33**

Additional Figures:

Everyone looking up to see where the wind takes a launched rocket.



Kids from the surrounding community came out to watch the event, with some taking pictures.

A rocket being launched by random kid as others take pictures.

Joe Coleman shows off his rocket with laser etched fins.

Here, rockets are stuffed with biodegradable wadding and parachutes are packed to prepare for a launch.

Here a rocket is being prepared for launch.

The digital altimeter is being removed from the payload section of a rocket.

The flyer for the rocket competition.