



**Society of Physics Students
University of Texas at Austin Chapter**

2012-2013 Chapter Report

SPS Zone: 13

SPS Chapter: 7254

School: University of Texas at Austin

Sigma Pi Sigma Chapter: 044

Chapter Advisor: Dr. Greg Sitz

Chapter Advisor Email: gositz@physics.utexas.edu

Document Preparers:

Evan Ott President 2012-2014

Jonathan Blair Secretary 2012-2013

Victoria Levy Secretary 2013-2014

..... Freshman Representative 2013

Tharon Morrison ... Webmaster 2012-2014

Crystal Riley Historian 2012-2014

Chapter Email: spsofficers@gmail.com

Chapter Website: www.ph.utexas.edu/~sps/

Chapter Facebook: facebook.com/groups/TexasSPS

Year in Review Summary

This year, the University of Texas at Austin Chapter of the Society of Physics Students (UT SPS) officers reenvisioned the services and goals of our organization, becoming more focused on research, outreach, and community. Our attendance and involvement increased to a regular group of more than 30 students and more than 70 students in total, following our initiative to raise the number of physics undergraduates at UT. As a result, we needed to refine our identity and provide a clearer sense of membership. This required both academic and extracurricular activities of a sufficiently diverse nature, unlike the regime of faculty lectures we focused on in the past. For better or worse, this resulted in an internal focus to build the infrastructure of our reenvisioned organization, damping our participation in SPS national events. However, we felt that the future prospects of the organization, including the motive and methods to participate in the SPS community, would be improved as a result of the programs we created.

Professional Physics Community

This year, The University of Texas at Austin hosted the South Central Conference for Undergraduate Women in Physics. A few of our UT SPS members spent months planning this event. The event lasted three days, each day packed full with exciting and valuable information. There were undergraduate talks (many of the presenters were indeed from our very own SPS chapter and physics department), faculty talks, poster sessions, lab tours, four Q&A panels (Career, Graduate, Undergraduate, Faculty), as well as some other unique speakers. The keynote address entitled "Why diverse teams will meet the science and engineering challenges of the 21st century" was given by Dr. Margaret Murnane of the University of Colorado Boulder. Dr. Sherry Yennello, professor and Associate Dean of Texas A&M University spoke about NSF and APS activities to support women in physics. Also, Crystal Bailey of APS spoke about outlook for careers in physics. After the conference, a Facebook group was set up so that all who attended could stay connected. The event was a huge success and every speaker provided something new and interesting to discuss.

Campus Community

UT SPS has essentially had an open door policy for anyone interested in physics for quite some time. However, we felt that too few people were taking full advantage of the offer, and it seemed that ignorance was the culprit in many cases. Our first large-scale outreach project, Prospective Students Day, produced a cascade reaction that resulted in the organization represented by this report. Once we saw the results of that work, we realized we had to continue down the rabbit hole. Balanced with our efforts to maintain a solid foundation for our members and affiliates, we have started a campaign to make our organization and UT Physics as a whole more inviting to the campus community. As with the rest of our designs, academics and social events played hand in hand.

Prospective Students Day

During spring 2012, UT SPS officers decided to augment ongoing department efforts to increase the number of physics majors by co-hosting the Physics and Astronomy Prospective Student Welcome Days with the Astronomy Students Association. UT SPS led the charge, organizing dinner, lab tours, class visits, student panels, the famous Watermelon Drop, and overnight housing for more than 50 prospective students. Feedback was overwhelmingly positive, and the next semester, many freshmen who attended were fired up to help with round two. In fact, for spring 2013, the College of Natural Sciences expanded our event for not only the physics and astronomy departments but also many of the sponsored student organizations. With tighter time constraints on the event, we had to condense the original event as much as possible, while still exposing students to everything UT has to offer. Though student attendance was smaller (30 students and 30 parents) due to invitation delays, the event was undoubtedly a success. Both events were funded in part by our own fundraising and in part by the Department and College.

We are very proud of this new tradition for UT SPS and look forward to seeing the event grow in coming years.



The famous Watermelon Drop in front of 14-story Robert Lee Moore Hall

Sunday Night Study Sessions

As part of UT SPS's outreach to the UT community, we continued the tradition of coordinating a weekly study session for all students in physics classes and any with physics-related questions. In particular, we advertise the sessions to the introductory physics classes to help students who are having trouble learning how to problem solve or interpret calculus-based physics problems. Upper-division students help tutor lower-division students while we all feast on Tiff's Treats cookies. Generally 30 or more students come to our Sunday Night Study Sessions to work on homework for the week.

RLM Roundup

UT SPS has had many cookouts and potlucks over the years. But this time, instead of inviting only physicists, we decided to invite all of the undergraduates in the Physics, Math, and Astronomy building known as Robert Lee Moore Hall (RLM). UT SPS, the Astronomy Students

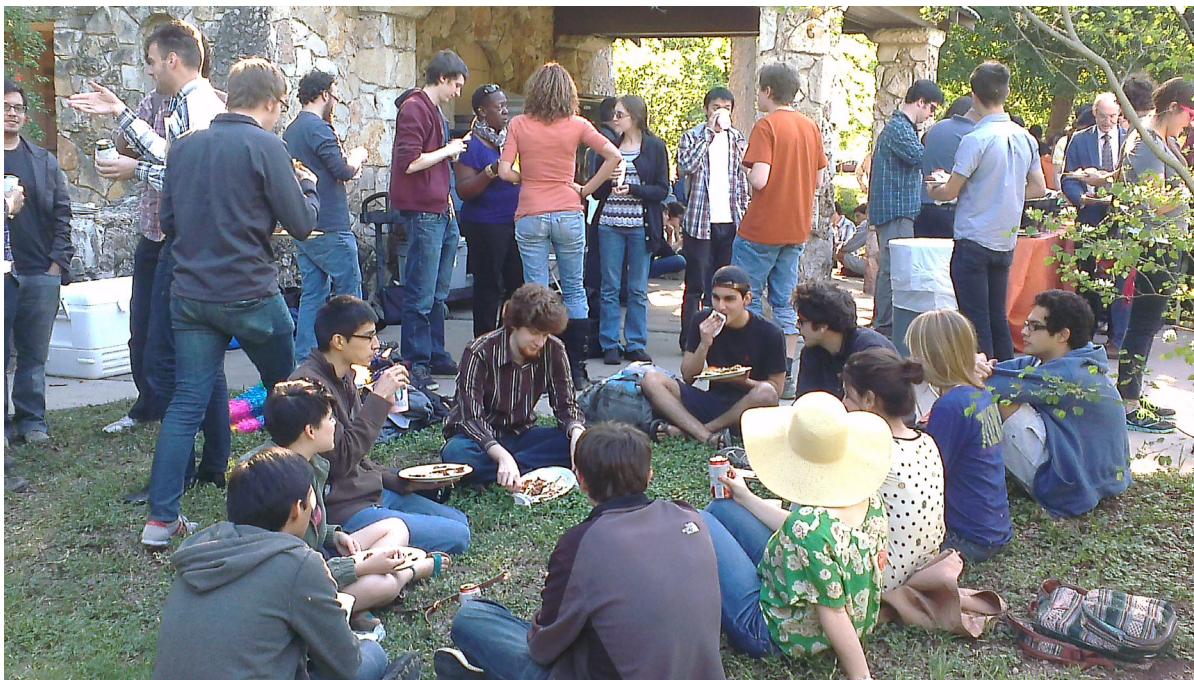
Association, and the Math Club sold tickets to this event at weekly meetings. \$5 got you an all-you-can-eat buffet of burgers, hot dogs, cookies, snacks, and more. In addition to all the food, there was a piñata, Ultimate Frisbee games, and even a Fresnel lens solar cooker that UT SPS Treasurer, Dawson Baker, made from an old projection TV screen. Although we cooked all of the food on a grill, we did manage to use the Fresnel lens to melt some cheese over chips to make nachos. With 25 or so in attendance it was a very successful event – one we hope to repeat.



Treasurer Dawson Baker setting up the Fresnel lens
at the RLM Roundup to cook hot dogs.

Semi-Annual Physnic

The Physnic is a large picnic held once a semester by the UT Department of Physics and UT SPS with the simple purpose of gathering students and professors to an evening of good times. Due to the wide audience, a variety of activities is required to ensure a good time for everyone. So, UT SPS has developed the idea of "bring a piñata!", an idea proposed by an individual of our organization. This works well for any party for which you do not know what to bring. Therefore, this last semester, UT SPS brought a piñata to the Physnic, and it was a hit, er, so to speak! It was certainly a community building activity, as professors, undergrads, grad students, and friends of each came to have a whack at the piñata! This sort of wide-audience, community activities are a strong part of what UT SPS looks for in its events, and this one was a definite success.



The Spring 2013 Physnic

Intramural Sports

While many of UT SPS's activities are oriented toward research and general life in academia, one important facet of what we do is actually participating in intramural sports! We regularly field a team for Ultimate Frisbee and frequently do well. In fact, our Chapter Advisor, Dr. Greg Sitz, has been known to take a dive into the ground for the good of the team. Physicists around the world may not be known for their athleticism but we're doing our part! In cooperation with our efforts to increase the number of undergraduate physics majors at UT, we use athletics to diversify our community-building activities.

Bowling

In search for some more non-academic events, UT SPS invited all its regular meeting attendees to bowling. Since the university has an on-campus bowling alley, this event was easy to coordinate. The turnout for this event wasn't high, with approximately 5 members attending, but being on a weeknight, this was not too surprising. The result of this 2 hour bowling session was fun and good friendships. UT SPS also learned: understanding mechanics does not guarantee the coordination to apply it.

Physics Undergraduate Student Lounge

The UT Physics Undergraduate Student Lounge has had years of messiness and dismay, so a few of the UT SPS officers broke down and cleaned up the lounge. The floors were scrubbed, tables wiped, chalkboards washed, and a few of the chairs replaced. This created a much nicer working atmosphere and the lounge became less of an unpleasant hangout. While unfortunate, this was a necessary task and has inspired the UT SPS community to help maintain the space.

The environment is now inviting, providing students a comfortable place to study and helping to build the physics community sought after by UT SPS.



The Physics Undergraduate Study Lounge post-renovation. During school hours it is not atypical to see every chair filled and chalkboards full to the brim.

Mentoring Groups

In order to better serve the UT Physics community, this spring semester we initiated mentoring groups. Upperclassmen volunteered to be mentors (or Jedi Masters) and anyone else could sign up to be a mentee (or Padawan, to complete our Star Wars tribute). To make it easier for mentees to choose a group that fit them best, each mentor wrote a paragraph about themselves and the topic of the group. In addition, we set up a Google Calendar on our website so mentees can see when each of the different groups had meetings. Each mentoring group held a meeting on a weekly basis and provided Tiff's Treats cookies, a local favorite. The group topics ranged from specific research interests, such as AMO and condensed matter, to groups that discussed just general physics/life. These groups introduced students to new fields of physics, gave advice about how to get involved in a research lab, and more. There were three main groups with a total of ~15 students involved. But most importantly, these mentoring groups helped to build a better community among the physics majors. We are looking forward to continuing with mentoring groups this fall semester.

Weekly Student Research Presentations

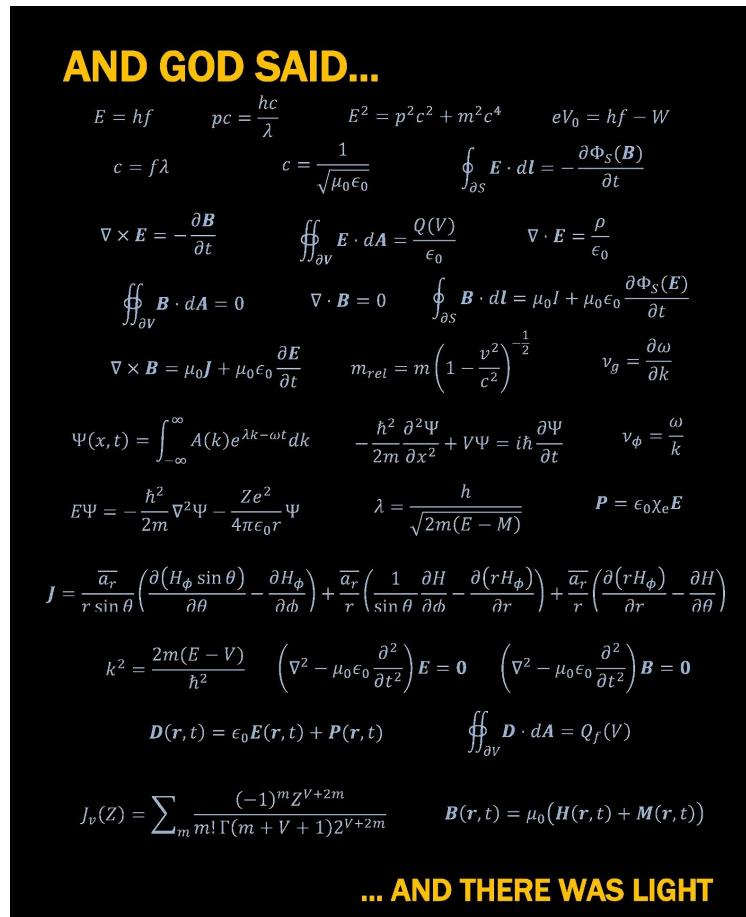
UT SPS has met weekly for years, generally bringing in professors to give talks about their research. While fascinating, we felt the topics grew steadily stagnant so during the spring semester we added a new activity: having undergraduates present their research to UT SPS. We had presentations from a variety of backgrounds - plasma physics, surface science, astrophysics, metamaterials, and more! The presentations lasted approximately 15-20 minutes, followed by a Q&A session with our 30-40 meeting attendees of about the same length of time. During these sessions it was common to see the upperclassmen ask detailed questions drawing from their experience (from in class or elsewhere), and equally common to see underclassmen asking questions about how to get involved in the field and what background information they would need to know. Feedback from all ranges of students has been positive and these student research presentations have rapidly become a staple of our meetings.

Revenue Sources

At the end of the day, our wild schemes of making a new, much more awesome chapter of SPS boiled down to a question of funding and time. In our traditional fashion, the expense of the latter was waived since we wanted to see this to completion. (Is midnight oil a renewable resource?) However, funding a larger set of events posed a challenge. Traditionally, our revenue stems from physics-related t-shirt sales, while we spend money mostly on food (pizza at every meeting) and supplies for the Undergraduate Lounge. In the process of initiating our programs for physics majors, we turned some heads. That, in turn, helped us acquire the remaining resources necessary to accomplish our goals. We received help from the UT Physics Department as well as from the UT College of Natural Sciences. This assistance is planned to continue into the future, supporting our growing list of programs and services.

T-Shirt Sales

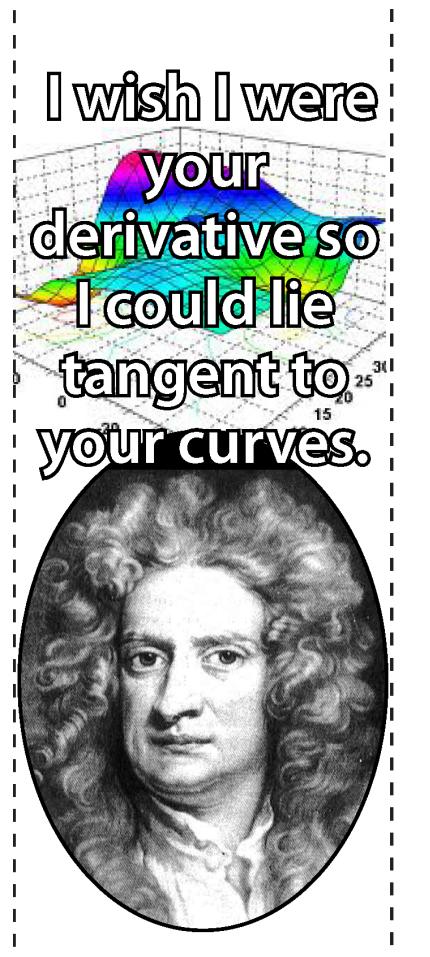
A large portion of the funds that our chapter uses throughout the year comes from our creation of and sale of original t-shirts. This year yielded fairly successful t-shirt sales, bringing in more than \$700 in revenue. UT-themed shirts are always popular, but this year we created a Newton shirt and a Top Quark shirt that gave a decent showing. Shirts were sold mainly for two weeks during the first semester in addition to the College of Natural Sciences' Family Day and our Prospective Students Day. We are proud of the spirit that these shirts inspire in our members.



One of the designs created by UT SPS for t-shirts

Valentine's Day Cards

February is a pretty quiet part of the year for most physicists and mild discussion of fundraisers were about, so UT SPS decided to make and sell fun, physics-oriented Valentine's cards. They were a bit of a last minute idea, but seemed to catch on fairly quickly. Most were designed such that they could be given to a friend, and not necessarily a significant other and they were sold for \$1. Not a large profit was made this year however, because they were printed on expensive paper. Approximately 50 cards were sold. In the future, this could likely be a successful February fundraiser if more variety and advertising were done.



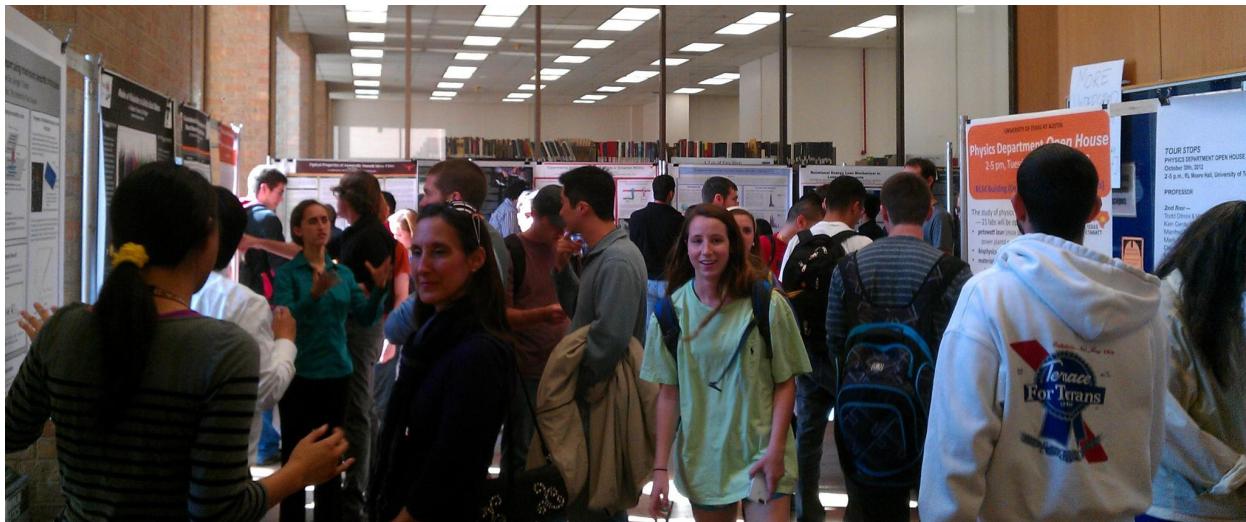
The Newton-themed Valentine's Day card

Off-Campus Community

Physics Open House and Poster Contest

In the past, the UT Department of Physics hosted an Open House where professors would open up their laboratories to the whole university to better showcase what cutting-edge physics looks like and help get students interested in physics. The event had disappeared for a couple

years, but UT SPS worked with Dr. Harry Swinney last fall to bring it back and do so in style. In addition to 28 laboratories open for three full hours, we had more than 35 students from nearby high schools come visit in addition to hundreds of UT students and their families and friends, while conducting a research poster contest with more than 20 undergraduate physics and astronomy students presenting posters to graduate student judges, competing for a total of \$500 in prize money for the top 3 entrants. To top things off, we had a traditional Watermelon Drop off the roof of the physics building, reaching speeds of more than 50 miles per hour in a spectacular explosion of fruity goodness.



2012 Physics Open House Poster Session

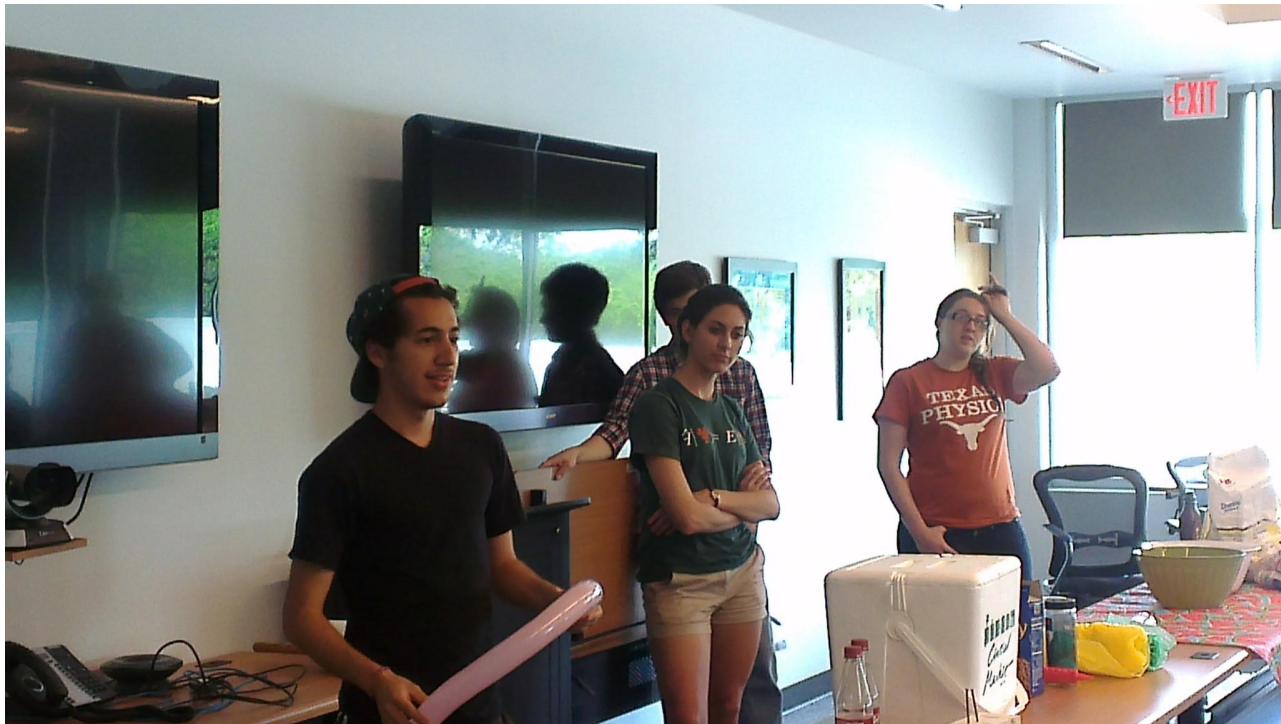
Explore UT

Explore UT is a campus-wide event where all departments, colleges, and many student organizations put their best foot forward in "The Biggest Open House in Texas", and UT SPS joined in, flying full colors. UT SPS manned tables along the main roadway through the College of Natural Sciences' part of the University. We demonstrated numerous physics concepts from conservation of angular momentum to the Bernoulli Principle, concocted dazzling displays and delicious ice cream with liquid nitrogen (1,000 servings!), and even showcased the raw power of confining liquid nitrogen in a soda bottle (prepared methodically for safety)! While much of our audience was families with young children, there were plenty of curious high schoolers and prospective students who stopped by our tables. We were available to answer questions physics-based or college-based, and also received many inquiries as to the availability of our UT SPS shirts. The volunteers enjoyed themselves, a few young, absorbent minds learned some physics, and UT SPS got its name into the community.

Volunteering at Southwest Keys

In late April, UT SPS helped organize an outreach event led by UT Physics student Lisandro Rodriguez. Lisandro's fraternity, Chi Phi, regularly volunteers at the East Austin National Headquarters of the non-profit organization Southwest Keys, which helps at-risk and paroled children and teens around the country. Lisandro arranged for UT SPS to perform a Physics Circus

for the students one Saturday afternoon. UT SPS Vice-President, Gabriel Cossio, led the show, engaging students and adults with carefully designed demonstrations. He also gave an impromptu speech on how even the officers of UT SPS hate school sometimes but keep going because they want to learn ever more. Even students who hadn't shown any enthusiasm during famous Austin-based radio host DJ2DQ's story about how he turned his life around began to perk up after Gabriel's speech and proceeded to enjoy the rest of the presentation. We were surprised at the amount of positive feedback and participation we received from our audience and hope to return to Southwest Keys next year.



Performing at Southwest Keys. From left: vice-president Gabriel Cossio, outreach coordinator Courtney Campion, historian Crystal Riley; behind: volunteer Jason Koeller

What Makes UT SPS Unique

If anything stands out about UT SPS, it is the people who make up our community. The work put into this re-envisioning was nontrivial, but it was the ambition, support, and curiosity of our members and friends that made everything worthwhile. Unfortunately, those qualities are very difficult to quantify, so we must hope that our activities provide some useful measure. Each shows an aspect of what defines us as a community and as an organization. There have been a lot of laughs, bright ideas, and plans tabled for future work. We are excited for the new UT SPS and look forward to the next round of innovations. As we say at UT, "Hook 'em!"

Student-led Mini-Courses

As part of UT SPS's initiative to help students get prepared for work in the laboratory and industry, we began student-led courses in spring of this year. UT SPS President, Evan Ott, and

Secretary, Jonathan Blair, led a four-week seminar on the LaTeX markup language which is used for scientific documents in journals and more. During the seminar we posted materials online (available at <http://www.ph.utexas.edu/~sps/pages/resources.html?modalID=LaTeXModal>). UT SPS Treasurer, Dawson Baker, is taking these resources and expanding on them to create a Research Skills Manual this summer covering LaTeX, MATLAB, Mathematica, LabVIEW, and more to provide a consolidated reference guide for UT Physics students. Our Vice-President, Gabriel Cossio, led a workshop for several weeks in the Student Machine Shop to introduce some students to the process of fabrication, using milling machines. We hope to expand on these courses over the course of the next year, including seminars on Python, Hadoop, Raspberry Pi, and an advanced Machine Shop seminar.

Astronomy Students Association

Since our chapter of Sigma Pi Sigma was only brought back into existence at the end of the spring semester, and the Women in Physics group is still getting off the ground, UT SPS is the main physics group for our 50,000 student campus. However, the Astronomy Students Association, which largely doesn't overlap in terms of regular meeting attendees, frequently partners with UT SPS to coordinate potlucks and other events. We have coordinated with the UT Math Club in the past and plan on partnering with other organizations next year, particularly now that Sigma Pi Sigma will be rejoining many other scientific honors societies at UT.

Hex Rally

In 1986, the Texas Exes alumni organization and the Physics Department at UT teamed up to bring back an old, though occasional, tradition of a "Hex Rally" before the UT-Texas A&M football game - one of the biggest rivalries in college football. Expanding on the old tradition of lighting red candles, UT Professor Dr. Austin Gleeson helped build a large gas-powered torch for the ceremony to be lit each year by Society of Physics Students members. Although A&M changed NCAA conferences, the tradition persists in preparation for the Thanksgiving Day game. The UT Physics department may be one tiny fraction of the university as a whole, but for one shining moment UT SPS gets to take the stage, and be central to a tradition dating back to the 1940s.

Annual Fermi Question Competition

Near the end of the spring semester, many students were frustrated either with their classes or general stress of upcoming finals. Being upcoming physicists, we tend to "blow off steam" a little differently: in a contest of wit. In celebration of physicist Enrico Fermi and his remarkable estimation of the strength of the atom bomb during the Trinity Test, UT SPS held our 3rd Annual Fermi Question Competition involving 6 challenging problems developed by Chapter Advisor, Dr. Greg Sitz, and 20 fast-thinking physicists-to-be. These Fermi Questions are estimation problems designed around dimensional analysis, physical intuition, and clarification of assumptions. Prizes are given to the winners, but the atmosphere is all friendly competition. UT SPS enjoys putting on lightweight academic activities, such as this, for its students to remind everyone Physics is Phun (fun)!



Lighting the torch. From left:
Alex Robles (volunteer), Evan Ott
(president), James Hoover (volunteer)



UT Football Coach Mack Brown lighting his
red candle off of the UT Physics torch

Student Representation in the Department

Each semester, UT SPS has a meeting devoted to discussing the upcoming courses offered by the UT Physics department. Upper-division students recommend courses and sequences to help lower-division students determine the best path for their degree plan and future career and research paths. This year we also took a survey of undergraduate interest for physics courses not generally offered but listed in the UT Course Catalog. We provided the results of the survey to the Physics department, facilitating the selection of electives to offer for the next two years.

Sigma Pi Sigma Chapter Activity Report

UT's chapter of Sigma Pi Sigma dates back to 1946, but in recent years has been inactive and devoid of members. During the spring 2013 semester, the UT SPS officers determined that re-instituting the Sigma Pi Sigma chapter followed our goals of promoting scholarship, research, community, and excellence, while providing an incentive for members to participate in volunteering and community service opportunities. With that in mind, we inducted 15 members to our chapter in May, four of whom graduated later that month, receiving Sigma Pi Sigma honors.

cords at no charge, courtesy of normal SPS fundraising. Because we accept all students interested in physics at our meetings without charge, we typically have few National SPS members, but with these inductees, we now have at least 12 current UT members. We anticipate that Sigma Pi Sigma will provide an avenue for new and exciting activities for UT Physics, tentatively including: organizing a distinguished lecture series; maintaining a research skill manual in development this summer by 2012-2013 UT SPS Treasurer, Dawson Baker; producing an annual collection of physics theses and other unpublished works; and performing outreach to local schools.



Sigma Pi Sigma Inductions 2013, UT Physics Chairman Dr. Richard Hazeltine
and UT SPS/Sigma Pi Sigma Chapter Advisor Dr. Greg Sitz presiding

Note from the President

Through the work of all the officers who have served over the past 2-3 years, UT SPS has transformed from an admittedly lame, nearly-inactive organization to a flourishing, dynamic group of individuals united by common interests and cause. I am proud of all that we have accomplished, and cannot wait to see what new activities surface over the next year. However, very little of this could have happened due to student efforts alone. To that end, I would like to thank the UT Department of Physics faculty for their support in lab tours, presentations, and other endeavors. I would like to say a special thanks to the people without whom some of our greatest triumphs would have ended in sheer failure: Dr. Sacha Kopp, Associate Dean for Undergraduate Education for the College of Natural Sciences; Dr. Greg Sitz, UT SPS/Sigma Pi Sigma Chapter Advisor; Dr. Richard Hazeltine, Physics Department Chairman; Lisa Gentry, Physics Undergraduate Coordinator; Ka'rin Thornburg, Assistant Director of Admissions and Recruitment for the College of Natural Sciences; Elizabeth Morgan, College of Natural Sciences Recruiting and Student Life Coordinator; and Dr. Harry Swinney, Professor, Department of Physics.

I would like to also publically thank the UT SPS 2012-2013 officers for their support, creativity, and determination to do what is best for the community: Gabriel Cossio, vice-president; Dawson Baker, treasurer; Jonathan Blair, secretary; Joseph Crowley, outreach coordinator; Victoria Levy, freshman representative; Tharon Morrison, webmaster; Crystal Riley, historian; and Miquela Stein, Astronomy Students Association representative.

We all are looking forward to the coming year to becoming more involved in the national and regional aspects of SPS while continuing to do our best to serve the UT Physics community, the university as a whole, and the Austin community at large.

~Evan Ott
UT SPS President 2012-2014
Class of 2015