

SPS Zone 18 Meeting, Apr 30 – May 1, 2010

Introductions and pizza

The annual, zone 18 SPS meeting began with a pizza party hosted by the University of California at Davis in their Physics/Geology Building during the last weekend of April. The students were from Fresno State, Sacramento State, and UCD. After dinner we introduced ourselves with icebreakers like trust falls and physics demonstrations. There were no actual trust falls, but a Rubens tube displayed the speed of sound in propane with a pleasing fire display. The tube was connected to a propane tank which pushes propane out of small holes cut into the top of the pipe. A tone, or frequency, played through a speaker connected to an end of the tube varied the flow of propane the holes, which in turn made flames in the shape of a wave. After measuring the distance of a wave, and using the known frequency we calculated the speed of sound in propane to be 240 m/s using the familiar equation:

$$\text{velocity} = \text{wavelength} * \text{frequency}$$

Someone should tell the band, OK Go, to use this in their next video.



UC Davis' Rubens Tube and students are above. Dark photo Below shows clear uniform wavelengths.



Spaghetti Towers

Following the demonstration, a battle of advanced physics ensued- the three schools built spaghetti towers with marshmallows. Each team approached the problem uniquely. Sac State made spaghetti pyramids as building blocks for a larger structure, which they then hoped to combine into a larger, sturdy pyramid. The plans strength was integrity and allowed for each member to contribute with the blocks. CSUF approached the problem clearly following the mantra 'less is more.' The overall plan was to build up, not out. UC Davis used a complex version of a pyramid which had many vertical beams focused on a point at the top. They also had students working on the leaning of their tower.

It became evident by 8pm that a 15 minute time limit needed to be set, because two of three schools had no apparent end-time and would have built mini Eiffel Towers. In the final minutes, Sac State and UCD furiously built up, while Fresno State lazily watched. At 8:15 exactly, Fresno State had the highest tower. Thirty seconds later their tower collapsed, leaving Sac State with the tallest tower. As if to build suspense, their structure collapsed shortly after, making UCD the winners. But, of course, their tower decided to favor gravity as well. Sac State and UCD then alternated between having the highest tower, switching leaders like the end of the Daytona 500. In the end, by split-decision, the judges handed the "Highest Pile-o-Rubble" award to Fresno State.

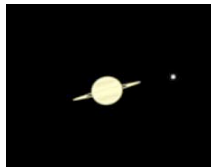


Top-left: Sacramento State, Top-right: UC Davis

Fresno State bottom

Astronomy

At the very top of the Physics/Geology building one can overlook the entire UCD campus and it is massive with giant, ancient trees masking the landscape like a forest. This gives the campus the appearance of having much fewer buildings than it does and accentuates the many quad-like areas which dot the campus. Furthermore, this roof makes for the best stargazing on campus! With five telescopes and enthusiastic students from UCD delivering a star tour, SPS students and community members alike enjoyed the information and relaxation. One of the highlights was Saturn's rings being edge-on to the Earth, which only happens every 15 years. Our resident Fresno State astronomer marveled at the community involvement stating that educating children about the stars is a thrill for the true astronomer.



Saturday

Breakfast

Saturday was going to be very busy, so we all met for breakfast. The cupcakes were worth the price of admission, figuratively, because thankfully CSUF paid for us to get there. Four more schools joined us this day, CSU Chico, Stanislaus, Sonoma, and Pomona. After light conversation we all headed to Roessler Hall with a theatre-like atmosphere and inviting outdoor architecture making it an ideal place for Saturday's seminars. Dr. Harris began by laying out the itinerary for the day. Dr. Singleton then covered the standard SPS information and urged us to discuss any pressing topics or concerns. Among topics discussed was possible methods of raising funds.





Keynote Talk - Prof. Raymond Chiao

The keynote speaker was Professor Raymond Chiao who artfully danced between quantum mechanics, superfluids, and gravity waves from an experimental point of view. Rare are the seminars on gravitational fields that are not theoretical. Dr. Chiao demonstrated how gravity waves affect quantum particles in a superfluid in such a way that the combined system can produce an e&m wave. He has designed a chamber to exploit these effects which he related to the Millikan oil drop experiment. With two of these systems in series, he can input an e&m wave which the apparatus will transmit as a gravity wave to another apparatus, which will hopefully output a detectable e&m wave. In other words, he hopes to transmit a gravity wave. Aside from communication via these transmitted gravity wave, this superfluid also acts as a sort of mirror which he hopes to combine several mirrors to make a telescope. From there the possibilities are endless, but any physics student would love to be at the beginning of that experiment's success. Can he do it?



Dr. Raymond Chiao (UC Merced) and Dr. Douglas Singleton (CSUF)

Dr. Olsen

Dr. Thomas Olsen from the Society of Physics Students gave a career-oriented talk, with highlights such as physicists scoring the highest on the LSAT and very high on the MCAT. As physicists, our career opportunities are numerous, but in applying for jobs we must convince employers of the versatility of a physics degree. I know several students with a BS in physics that applied, and were successful working in engineering jobs.



Dr. Thomas Olsen

Atom Smashers

After eating tasty deli sandwiches and sharing thoughts about research projects, we watched the PBS movie "Atom Smashers" about Fermilab's Tevatron particle accelerator and the Stanford Linear Accelerator (SLAC). The movie follows the sometimes frustrating pursuit of new science via Fermilab's physicists in search of the Higgs Boson hoping to unify the standard model of particle physics. The rat-race nature of government and economics conflicts with the maintenance of Fermilab as well as compiling and interpreting the massive amounts of data it produces. Another aspect of the movie covers the life and relationships of physicists working overtime to reach an unrealistic deadline. As a student who commutes every day to a different school than my long-time girlfriend, I was touched by the movie and felt slightly reassured that others endure similar and even tougher situations. There are many reviews on the net, but I definitely recommend this movie to young physicists especially. Physicists must constantly work on dealing with authorities like the government and deadlines which are beyond our

control and somehow maintain healthy relationships in a research-driven field. However, we rarely, if ever, take classes or even discuss these notions. Atom Smashers addressed all of these issues.

Crocker Nuclear Lab

Students interested in the Crocker Nuclear Lab were given a tour during Atom Smashers. This lab is used for air quality studies and for retinal tumor treatments.



Crocker Nuclear Lab Accelerator

Lab Tours

The students at UCD opened their labs in the afternoon for tours and questions. In one lab, Dustin Gilbert synthesized nanoparticles with hopes of efficient hydrogen storage. He and his peers were also creating magnetic vortices on a quantum scale which can transmit information in a way very similar to a hard drive but with one extra bit (00, 11, 01, 10), also known as a quinary bit. In another lab, Jason Kaszpurenko explained how creating new, unique nanotubes was presenting new problems and how they were planning on proceeding. Who has not dreamed of researching something no one has done before? I was also glad to find out I'm not the only one to struggle through Jackson's e&m problems.



UC Davis Physics labs of (clockwise): Profs. Rena Zieve, Nick Curro, Dong Yu, Robert Svoboda



Prof. Mani with students

Chertok Speech

Dr. Chertok brought the meeting to a close with a discussion of the fundamental questions of the universe. The CMS site at CERN is primarily used for high-energy, muon-muon collisions with a hope to discover properties of the elementary particles which make up the standard model. A question he hopes to answer is why our universe favors matter over antimatter.



Dr. Chertok presenting

Conclusion

Time passed by very quickly and at the end of the day it was clear that the annual SPS meeting for zone 18 was a great success. Some of us found a new direction to take regarding research and others felt reassured about future choices soon to come. A fair amount of networking, communicating, and debating took place. All in all, you will definitely see me at the next annual SPS zone meeting, and I suggest you, your friends and peers attend as well. The SPS meetings bring a unique group of people together with similar interests and provide an opportunity worthwhile of your time.