

# The Dilated Times

The newsletter of the Drew University Society of Physics Students

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Editors: Helen Geib and Heather Hughes

## A National SPS...Reflections from the Diamond Trail

Is a national Society of Physics Students necessary? Couldn't a local physics club serve our needs without the dues incurred by a national office? If all that you're looking for is a pizza party each year, then a physics club is what you want. But SPS offers what only a national organization can provide - the opportunity to interact with students and faculty from across the nation. This is in addition to its collective resources for professional development, community outreach, and campus programming.

As an Associate Zone Councilor, I had the privilege of attending the SPS National Meeting last November in Atlanta, Georgia. SPS flew more than thirty students and faculty from around the country to share their experiences and to plan for the future. In small round table discussions, we brainstormed about the long range goals of the physics community; this included a re-evaluation of the physics major. In a setting where each person at a table was from a different school, students were able to provide feedback about their education in a manner not usually possible between a student and his or her teacher. I don't think I've ever seen such a frank exchange between students and faculty.

At council discussions, I learned about the opportunities offered by the SPS Journal of Undergraduate

Research in Physics (JURP), which offers students the opportunity to publish an article while still in college. Because the Atlanta meeting was part of the 75th Anniversary Diamond Jubilee Celebration of the Physics Honor Society, it was attended by many physicists and hidden physicists (former students of physics working in other fields). From these alums, I learned about the wide range of career paths open to a physics major. Most memorable, however, were the friends I made spending time with students and faculty at lectures, banquets, and on tours of the city.

While in Atlanta, I learned that SPS had been invited to the American Association of Physics Teachers

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(AAPT) meeting in Phoenix, Arizona in early January. Coincidentally, the National Meeting of APO, my national Service Fraternity, was taking place in the same city just a few days earlier (as it turned out, in the same hotel). With both conventions to attend, I received enough support on campus to finance a trip

to the desert - one which I will never forget.

Arriving in Phoenix early, I was able to help with on-site registration where I met members of the AAPT professional staff and executive council. Members of AAPT were eager to interact with students; I felt welcome even before I had registered. Over the weekend, I attended a workshop about jobs from the perspective of a physics teacher, a physicist working in industry, and a representative from AIP Career Services. I attended sessions devoted to SPS students, talks by physics teachers, and the awards plenary sessions. Meanwhile, sunny Phoenix offered great restaurants, entertainment, and outdoor activities during a season when my hometown was covered with snow.

When I joined SPS as a freshman, I never imagined the places it could take me - first local meetings in New Jersey, New York, and Pennsylvania, then national meetings in Georgia and Arizona, and maybe one day to an international conference. During my travels, I learned about the level of activity in physics across the country and met many physicists and physics students, some of whom I am still in contact with today. It seemed like everyone I met gave me either a piece of advice or an  
...continued on page 2  
offer of assistance for possible

### A National SPS (continued from page 1)

graduate study and career opportunities, both in traditional physics fields and related areas.

Participating in cooperative SPS events gets me excited about our local chapter. I view Drew's SPS as not just a physics club, but one part of a greater body of students and faculty who share a common interest in physics.

-Matthew Diamond

### Drew Physics On-line

The Physics Department is now on-line, at <http://daniel.drew.edu/~physics/phys.html> (created by senior Jon Paley and Dr. Fenstermacher). The page includes general info on the department, SPS, RISE/research, astronomy at Drew, current students, and info for prospectives. Looking for the laws of cartoon physics or the official quantum mechanics homepage? There are links to entertainment, physics organizations, journals, and career options. Log on and be greeted by Albert Einstein, a friendly reminder of those lifesize cutouts that lurk in the labs! Then read the rest of this issue of the Dilated Times

### Quotable...

Jon...in a parity inverted coordinate system, "2 wrongs *do* make a right!"

Dr Supplee...re a physics book: "Every year it's a year older"

..."vectors aren't just any old numbers with commas in between"

...to a vocal mechanics student: "I like your spirit, but you need a 2% filter"

..."don't tell anyone in the physics department I called it that"

..."I'm messed up, but to what order?"

Sarah..."I realized that I can't teach calculus in Mississippi 'cause they don't have integration there."

...after a high test score: "I feel like Maurie Brewer!"

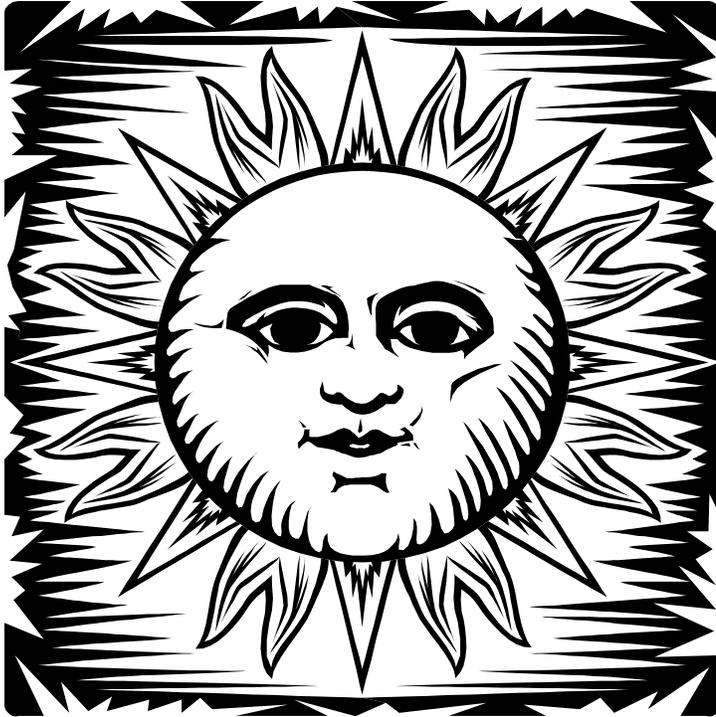
P.W. Bridgman..."The scientific method is doing your damnedest, no holds barred."

Albert Einstein..."I cannot believe that God would choose to play dice with the universe."

### Comet Hale-Bopp in the Spring Sky

For the second time in two years a naked-eye comet is available for viewing in the night sky. It was discovered independently in July, 1995 beyond the orbit of Jupiter, by astronomer Dr. Alan Hale, and amateur Thomas Bopp, and is known officially as Comet Hale Bopp, C/1995 O1. The plane of the comet's orbit is perpendicular to that of the earth, and it is currently seen in our northern sky. Unlike Comet Hyakutake, which last year came within 9 million miles of earth, Hale-Bopp will come no closer than 122 million miles from earth on its way to perihelion on April 1. However, it will still be a very bright object for viewing, given the size of its nucleus, estimated to be 10-40 kilometers across. With an absolute magnitude of -1, the comet is intrinsically the brightest to pass inside the earth's orbit since the great comet seen by Tycho Brahe in 1577. The best evening viewing will be late March through April 11, a moonlight-free period of time. During this period and after, it can be seen by the naked eye, and better with binoculars, about 10-20 degrees above the NW horizon for several hours after sunset, becoming higher and higher each evening. In relatively darker areas, you may be able to see its two pronged tail - one straight behind of ions, and a second trailing off of dust grains. By late May, the comet becomes too close to our line of sight with the Sun, and then crosses over into the Southern Hemisphere for viewing there as it recedes from the solar system. SPS plans comet viewing sessions during the weeks following Spring Break. Keep alert for announcements.

# The Man, The Myth, The Legend - Tycho Brahe



*Tycho's supernova (isn't it lovely?)*

Wanted: editor for the  
Dilated Times

Graduation is almost upon us (May 24, or ask Heather for the countdown). (Look for an article on the seniors' plans in the next issue.) Both editors will graduate this year, so the Dilated Times is up for grabs. The editor/secretary will be elected later this semester. (It's really a lot of fun.) Think about whether *you* would like to take it on!



Tycho Brahe (1546-1601) was a Danish astronomer whose accurate observations enabled Kepler to formulate his three laws of planetary motion, which completed the description of the heliocentric system proposed by Copernicus.

The most important figure in Tycho's early years was his uncle, an admiral in the Danish fleet. The uncle wanted to adopt Tycho, and even kidnapped him when Tycho's brother was born. Tycho was sent to Leipzig at the age of 15 to study law. Against the wishes of his parents and uncle, he secretly purchased astronomy books and constructed crude instruments. He often stayed up nights making observations while his tutor slept. In 1566, part of Tycho's nose was cut off in a duel with another Danish nobleman. He replaced it with a composition of gold, silver and copper.

Tycho returned to Denmark in 1572, at the age of 26. In November of that year, he observed what was to become his most famous astronomical discovery, one of the few supernovae to be seen with the naked eye. Continuing to observe it until it faded after 18 months, Tycho verified that it was indeed a new star that had flared up in the supposedly unchanging sphere of fixed stars. At the age of 27 he became the most famous astronomer in Europe.

In 1576, King Frederick II of Denmark and Norway offered Tycho the use of the island of Ven to construct an observatory and alchemical laboratory. The king gave him dominion over the island's more than 2000 acres and even offered to pay all of his expenses. Tycho built a large castle and observatory, Uraniborg ("Castle of the Heavens"), on the island's highest point of land. He worked there for more than 20 years, collecting precise observations of the positions and motions of the planets and stars, achieving an accuracy within a fraction of a minute of an arc, an accuracy unsurpassed until the invention of the telescope.

After the death of Frederick II in 1588, Tycho lost favor at court. His own personality had much to do with this. He was haughty with members of the royal family, arrogant and neglectful of the welfare of his tenants. After a series of disputes with the new king, Christian IV, Tycho left Ven in 1597. He settled in Prague, where he died on October 24, 1601. Though he was never able to resume the work he had begun at Ven, he did meet Kepler in Prague and passed on to him the observations on which Tycho's fame still rests.

# Monsters from the Id! *or* 50s

Hollywood in the 1950s produced science fiction movies at a rate unequalled before or since. Reams of critical analysis have been written about what it all meant: why was sf so popular? was it really just about monsters and flying saucers, or was there a deeper subtext? Many people see alien invasion stories as cold war allegories, while it doesn't take an experienced critic to find atomic paranoia in the tales of mutants and monsters!

Interested in popular images of science and scientists? Sf films are the perfect resource. In 50s movies, science is often both the threat and the solution. A government monolith or corrupt scientist may create the danger by exploding one too many bombs or by trespassing in forbidden areas of knowledge. Then it's up to a more farsighted, or more humane, scientist to patch things up. Physicists appear most often (as both villain and hero), though doctors also make popular saviors.

Subtext or no, 50s sf is worth watching today for the same reason it was worth watching then - it's great entertainment.

The best films are exciting, imaginative and, yes, have good production values. *The Day the Earth Stood Still* boasts a fantastic flying saucer and robot, with a little incisive social commentary for good measure. *Them!* is the first and best of the atomic mutation films. *The Beast from 20,000 Fathoms* is prehistoric, but awakened by an atomic bomb test in the arctic (it soon swims south to New York City, where it takes out a Coney Island rollercoaster!).

In *War of the Worlds*, the Martians really want our planet. They take out several major cities, including LA before succumbing to earth's bacteria. In *They Came from Outer Space*, the aliens have crash-landed and just want to get

away. *The Thing* may be a walking carrot (as one non-scientist character puts it), but it's still deadly.

My own favorites are *Creature from the Black Lagoon* and *Forbidden Planet*. The latter is (of all things) a futuristic retelling of Shakespeare's *Tempest*. *Planet* has one of the best sf film robots and is the source of my title for this article (you have to see it for yourself). It's also the only movie I know of where the earthmen pilot the flying saucer!

*Creature* is notable for several reasons, not the least its scientist characters. The villain of the film may be a staple of sf, the scientist corrupted by money and fame, but the hero and his love (a scientist herself) actually seem like real people! If scientists are like that, maybe it wouldn't be so bad to live next to one after all!

A quality film would be followed by a rash of low budget imitators and/or sequels. *The Fly* spawned *Return of the Fly* while the *Creature* came back for both his *Revenge* and to *Walk Among Us*. *Tarantula* is one of *Them!*'s better offspring. Covering their bets, the writers of *The Deadly Mantis* borrowed liberally from both *Them!* and *The Beast from 20,000 Fathoms*.

Many of the second string features have their own charm, but some are admittedly terrible. *The Amazing Colossal Man* (taking the *Incredible Shrinking Man* in the other direction) is one of the worst films I have ever seen.

All of the films listed are on video (I found many through the public library). Check them out. Then the next time you hear *Independence Day* described as a throwback to the 50s, decide for yourself.

-Helen Geib



# Notes from the Outside

[This note is to share some news about another Drew physics graduate moving on to the real world after PhD work.]

I've been in the middle of a job search since about mid-August, and to my surprise there were many more opportunities for doctorate level physicists than I thought there would be. The trick was to use the web and the university-run career center. I was in the market for a job in industry, so I hardly bothered to read the want-ads in "Physics Today" (99% of the postings there were for positions in academia..... btw, I saw the ad for the opening at Drew. My friends think I'm crazy for not sending an application.) Anyway, I found that many companies were interested in me because of my physics background, and as one recruiter put it, "...we all know that physicists are smart".

My game plan was to target the semiconductor industry, but I panicked half-way through the search and started to send resumes to the web pages of any company that even hinted that they did anything remotely science based. Pretty soon after that, I began to get called for interviews - places like Northrop Grumman, IBM and even Microsoft. It turns out that Bill Gates was a physics major at Harvard before he dropped out, so he makes his campus recruiters look for physics people as well as CS. There were smaller companies also... mostly tiny firms of less than 40 people who live on government research grants.

I finally decided on a medium sized company in Fishkill, NY. It's a semiconductor fabrication plant in Fishkill, NY called MiCRUS. As a

spin-off company of IBM and Cirrus Logic, they act as a computer chip foundry for graphics accelerator chips and memory SIMMs (when the market is strong). It is right up my alley, since it combines all of the device physics I've picked up and all of the clean room experience I have. They have a class-1 clean room there, which means that in one cubic foot of air there is only 1 particle of dust! This is 10,000 times cleaner than a hospital operating room. I'll have to wear something called a "bunny-suit" which looks like a space-man outfit with a little slit in the face-mask to see out of.

The job I'm taking is as a liaison between the people in the clean room who operate the robots working on the chips, and the people in middle-level management who worry about things like yield and defect density. I'll get to run some experiments to try to make the fabrication process a little better, and I'll be on a team charged with bringing in new technology to shrink the smallest possible feature size from 0.35 micron to 0.25 micron.

It sounds like a small step from .35 to .25, but when you are talking about things that tiny, the physics and engineering of the problems get incredibly complicated. This is equivalent to getting exponentially more difficult to make things colder the closer you get to absolute zero (i.e liquid immersion, then hard pumping on cryogenics, then dilution refrigeration, then laser cooling, then magnetic trapping). And similarly it's more difficult to improve a vacuum the lower the chamber pressure gets (rough pumps, diffusion pumps, cold traps, turbo pumps, ion pumps). So my work at MiCRUS will be challenging but

extremely interesting.

I guess the point of this note is:

- 1) To brag a little about my new job and my May graduation date.
- 2) To help ease the fears of junior and senior physics majors who may think of abandoning physics and pursuing engineering or other fields in graduate school as a result of the perceived job market.

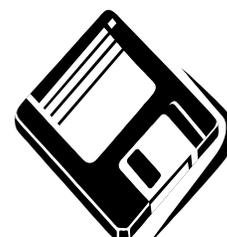
I heard that a number of recent grads have gone on in one or another engineering fields. Perhaps one reason for that is because they hear through the media or APS that there are no jobs for physicists any more. That's true to some extent if you want to be a professor, but I found it is not the case if you are willing to be a little more open minded in a job search. There are opportunities for physics PhDs out there - you just have to be creative in how you find them. Although (no offense to the Atomic and Nuclear/High Energy folks) I'm sure being an EXPERIMENTAL Condensed Matter student didn't hurt. High-tech companies are willing to talk to someone who can make a diode long before someone who can make a quark.

So, if you know of someone looking around for a graduate school, tell them to look at UVa..... there is going to be a vacancy at my desk soon.

Steve Gausepohl '92  
scg3y@virginia.edu  
University of Virginia PhD Program

## Career Advice on the Internet

Check out the physics careers bulletin board of the American Institute of Physics on the net (at <http://www.aip.org/aip/careers/careers.html>). AIP sponsors on-line mentors ready to answer questions about how they got where they are, what courses or degrees you need to fulfill your career goals, and how to combine physics with other career interests. You can get advice from physicists in industry, manufacturing, computers, education, journalism and law.



# UPCOMING SPS EVENTS...

week of March 24...Comet Hale-Bopp Watch

Saturday April 19...Spring Saturday

April 18-21...APS/AAPT Washington meeting

Tuesday April 29...Physics Awards Banquet and Sigma Pi Sigma Induction

Sunday May 4...Spring Picnic

TBA...Candidate Presentations



In December SPS celebrated its annual TACO PARTY, a venerable Drew tradition. University relations was so impressed they sent a photographer - you'll find us on p42 of the winter issue of the Drew Magazine. Featured (l-r) are seniors Jon Paley, Helen Geib (glimpsed in the background), Heather Hughes, Sarah Adams and Russ Castonguay.



Drew University  
Department of Physics  
Madison NJ  
07940

inside...

Merits of a National SPS...Astronomer Tycho Brahe...  
Comet Hale-Bopp...Career News from an Alum... Physics  
On-line...50s SF Films

Contributers: Matt Diamond, Steve Gausepohl, Dr  
Fenstermacher, Helen Geib