CROSS SECTION

Stetson University Physics Department Annual Newsletter, Spring 2005
http://www.stetson.edu/artsci/physics physics@stetson.edu

In this issue...

Area Happenings

Hello Everyone!

Greetings from the Physics Department, and as always, welcome to this year's edition of CROSS SECTION. We hope this newsletter finds you and your loved ones well, and we are pleased to share your news (in the "Alumni News" section – see page 12) as well as the goings-on around here.

This fall was, as you can imagine, rather disjointed with hurricanes Charley, Frances, and Jeanne shutting down the campus. Charley blew through before classes started, and while campus was closed for a week at the time, this really had little impact on our current students. Frances, however, was a major disruption, closing campus for more than a week. Students were evacuated, and the storm caused damage to several buildings including dramatically taking out the front entry-way to Carson/Hollis dorm behind Sage, flooding the Commons in the CUB, and (due to power outages) shutting down the campus-wide climate control system (which then took two full days to bring back to fully operational). Fortunately, Sage Hall was not struck by any physical damage, though the power outages caused significant loss in Biochemistry with reagents and other valuable samples and supplies stored in their super-cold freezers. The Physics Department took virtually no hit at all. By the time faculty, staff, and students were finally allowed back onto campus, the Facilities Management team had restored the campus to its beauty and aside from some lost trees and a couple of areas taped off with yellow "caution" tape, it was difficult to tell that the storm had blown through campus. Finally, Jeanne came along. By this time all of central Florida was weary to say the least, but while the storm threatened to be just as terrible as the first two we'd seen, things didn't seem as bad here in DeLand, and the University was only closed for one day. No one minded coming back to school so quickly this time around. And needless to say, all of Florida breathed a collective sigh of relief when November 30th marked the end of hurricane season for the year.

On to Departmental business... First, our students – We will have two seniors graduating this May, and we current have three junior majors. Our "sophomore" class (that is, those who have completed the University Physics course sequence and are therefore in their second year of the physics curriculum) is eight strong, and this spring's University Physics course has an enrollment of 16, with three already declaring physics as their major

and several others expressing an interest in the major.

As faculty, we are settling into our new curriculum, which we began instituting this year. So far, things seem to be going along smoothly. We have also acclimated to Tony's part-time status, which puts the Department at a full-time faculty compliment of 3.5. Things have also settled down with the FIPSE purchases. We have spent most all of our available funds, with only one last telescope order to be placed and we are working on incorporating all of that new equipment into our curriculum and research programs. Our labs are very spiffy – drop by and let us show you around, if you're ever in town! Laura continues to work on tracking the purchases for the entire division of Natural Sciences (her charge from the beginning) as there is still money remaining in other departments' allocations. Her tracking spreadsheet is impressively large, and her office is adorned with multiple binders holding all the paperwork.

So that's our news… As always, we wish you the best this year. Please keep in touch, and drop by if you're ever in the neighborhood…

—Kevin Riggs, Chair
kriggs@stetson.edu
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From the Dean of the College

Dear Friends of Physics,

I greet you at the beginning of 2005 and extend my thanks for your continuing support of your alma mater and especially of the department of physics. Guided by a faculty of devoted teachers, our undergraduates are doing impressive work in physics. Indeed, we always have physics students selected for our Summer Undergraduate Research Experience, which pairs undergraduates with faculty mentors of summer research, and the senior projects of physics students are always among the best presentations at our annual Undergraduate Scholarship Day. I am immensely pleased when we celebrate our physics seniors at the College's spring Honors Banquet. We are not a large program, but we send our students to the very best graduate and professional schools. Last spring, for instance, Jon Gosnell was admitted to Vanderbilt with a full fellowship. Latest word is that he is thriving there.

I hope you'll join me in thanking Tom Lick, Tony Jusick, Kevin Riggs, and George Glander for carrying on Stetson's fine tradition in undergraduate physics. In the laboratory, in the classroom, in office advising sessions, they push and pull our young physicists forward in ways that any of you who has studied with them knows well. Please also recognize the good work of Laura Glander, our department assistant (who oversees the physics T-shirt contest, which produced the winning T-shirt in the College's contest), and our wonderfully skillful machinist, Larry Ramsey. In fact, come by and see for yourself the fine work they are doing.

Finally, I wouldn't be a good dean, if I didn't remind you that one way to show your support of physics at Stetson would be to become a donor—to our scholarship endowments for physics students, to our restricted fund for the department and its teaching labs, or to our major capital campaign to renovate Sage Hall and build new science laboratories adjacent to it. If you'd like more information on naming

opportunities for that project, please contact me or the department. No project is more important to Stetson's maintaining its strong reputation for undergraduate science.

Sincerely,

—Grady Ballenger, Dean

gballeng@stetson.edu

Student News & Announcements

Society of Physics Students:

President for 2004-2005: Sarah Caudill

Sigma Pi Sigma:

President for 2004-2005: Wes Langston

New member, inducted April, 2004: Jon Gosnell

2004 Summer Research Participants:

Wes Langston — with Dr. Kevin Riggs at Stetson University

Speckle Pattern Averaging in Electronic Speckle Pattern Interferometry

Renee Dickinson — REU with S. Joshi and K. Webb at Clemson University

Design of a Force Sensor using Strain Gages to measure the Elastic Modulus of a Fibroblast seeded Scaffold

The Class of 2004:

Dan Carlson — pursuing his PhD in oceanography at Florida State University

Nick Frost — pursuing a career in the world of finance

Jon Gosnell — pursuing his PhD in physics at Vanderbilt University

Ari Litwin — pursuing his PhD in physics at the University of Central Florida

Research Corner

In the 2004 newsletter we showed you some pictures of Jon Gosnell ('04) working on our new Atomic Force Microscope (AFM), which he used to image the magnetic domain patterns of digital magnetic recording media (like hard disks and zip disks) via a technique called Magnetic Force Microscopy (MFM). The AFM was purchased through funding from a FIPSE grant from the federal department of education. This grant was facilitated with generous help from Congressman John Mica's office. Jon's work itself was funded through the Stetson Undergraduate Research Experience (SURE) program, and Jon's specific internship was funded with generous support from the Palm Beach Community Trust.

Jon's research project gained national recognition when he was one of 70 science undergraduates from across the country selected to present posters of their work on

Capital Hill in Washington DC on April 20, 2004 in an event aptly titled "Posters on the Hill" sponsored by the Council on Undergraduate Research. In recognition of this achievement we would like to show off some photos of Jon presenting his work in Washington DC. Fig. 1 is a photo of Jon standing by his poster (the long format of the poster was insisted on by the organizers in order to fit two posters per wall divider) in the event conference room of the Rayburn House office building.

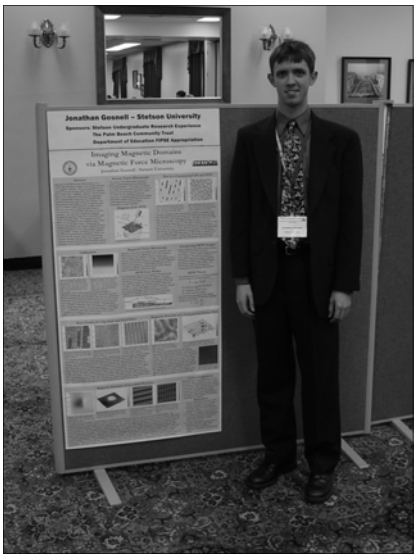

Figure 1 — Jon with his MFM poster in Washington, DC

Fig. 2 is a photo of Jon describing his project to one of the event attendees. Several Congressman and many legislative aides were in attendance. One of the guest speakers at the morning orientation session was a high level administrator in the National Institutes of Health (NIH), and after hearing about Jon's project at the poster session, she pronounced the research "neat."

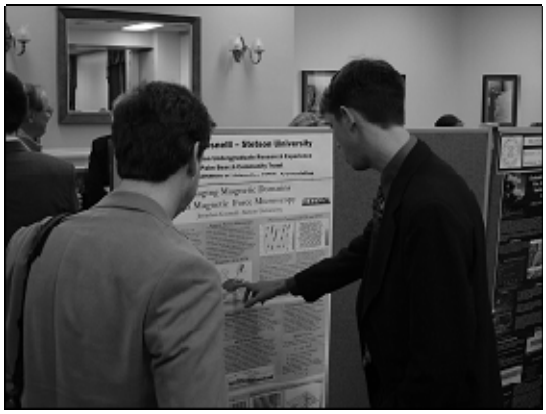

Figure 2 — Jon explaining his project

As part of the event, participants and their mentors were expected to put on lobbyist hats and lobby congressional offices for federal funding of science education and science

internship programs (for example, the Research Experience for Undergraduates (REU) program sponsored by the National Science Foundation that many of our own Stetson alumni have benefited from). We visited former Senator Graham's office and also visited Congressman Mica's office in hopes of thanking him personally for the help on the FIPSE grant. Unfortunately, Congressman Mica was not able to attend the event, but we had a pleasant sit-down with one of his legislative aides in Congressman Mica's office. Fig. 3 is a photo of Jon at that meeting with Mr. Joshua Gaboton, Congressman Mica's legislative assistant for educational issues.

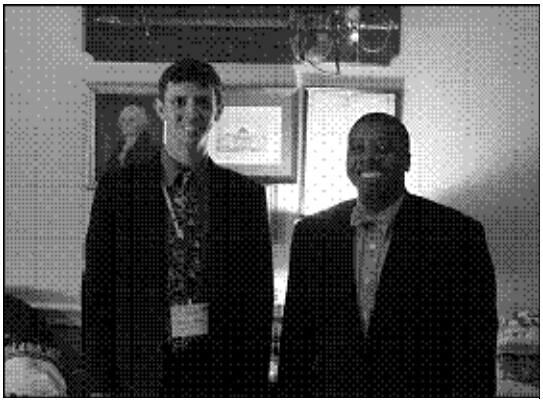

Figure 3 — Jon lobbying Congressman Mica's office

Jon now has even more reason to thank the federal government since he is currently attending Vanderbilt University on a full ride fellowship from the National Science Foundation studying for a Ph.D. in material science with a specialization in nanotechnology.

—Kevin Riggs

Abstracts

Every spring in Senior Seminar (PS-499), our senior majors (this year, Renee Dickinson and Wes Langston) present their senior research projects in a variety of formats. Here are their abstracts; they are followed by the abstract for the paper Dr. George Glander recently had published in the Journal of Applied Physics, detailing the research he worked on during his recent sabbatical leave...

Design of a Force Sensor using Strain Gages to measure the Elastic Modulus of a Fibroblast seeded Scaffold

Dickinson, R[1]; Joshi, S[2]; Webb, K[2]
1 Stetson University, Deland, Florida
2 Clemson University, Clemson, South Carolina

Tissue engineering is a science that focuses on restoring, maintaining, or improving tissue function; one aim is to correct the injuries sustained by connective tissues such as the anterior cruciate ligament located in the joint of the knee. It is hypothesized that the variation of cyclic

loading applied *in vitro* human dermal fibroblasts cultured in three-dimensional elastomeric substrates (skin cells seeded on biodegradable scaffolds) will improve the collagen production and mechanical strength of the cells/material constructs. The affect of applying mechanical stimuli to the scaffolds is measured by calculating the *elastic modulus* of the specimen. The objective of this project is focused on improving the method of determining the elastic modulus by recording data during experimentation in a non-destructive manner.

Speckle Pattern Averaging in Electronic Speckle Pattern Interferometry

W. Langston, Dr. K. Riggs (Stetson University Physics Department)

This project focuses on a technique that uses an optical setup similar to traditional holography replacing holographic film with a CCD camera. This process known as Electronic Speckle Pattern Interferometry (ESPI) or TV holography allows for a little more instability in the optical environment due to the shorter exposure time of the camera. The images created using TV holography are not 3-D like a traditional hologram, but they are still a very useful tool composed of light and dark fringes that can be analyzed to determine the vibration patterns of objects. These images are also not as clear as those created by traditional holographic methods due to the much lower resolution of the camera used in TV holography compared to holographic film as well as the speckle noise contribution caused by the laser used in this process. The primary focus of this project is to develop a computer program as well as an altered optical setup that will be used to improve the clarity of the images created by eliminating this speckle. The ultimate goal of this project is to use one piezo-electric mirror to change the phase shift of the laser light between 0 and 2π and a second piezo-electric mirror to alter the angle of the object beam fractions of a wavelength. Images will be collected and averaged pixel by pixel, and much of the speckle noise will be removed resulting in a much cleaner more valuable image.

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Evaluation of the small-cone variable axis method in the holographic analysis of Kikuchi electron-diffraction data

G. S. Glander (Stetson University Physics Department)
Journal of Applied Physics 96 (2004) 7239.

Holographic analysis is a method for directly inverting electron-diffraction data to produce a real-space image of the surface structure. A refinement called the small-cone variable axis method attempts to minimize artifacts and distortions in the image by limiting the data contributing to the inversion to ensure that the atomic scattering factors for the atoms being imaged are relatively uniform. Kikuchi electron-diffraction data from the Si(111)($\sqrt{3}$x$\sqrt{3}$)$R30^{o}$-Al surface structure were holographically analyzed with and without the small-cone variable axis method. Although the refinement produced a slight reduction in the background noise and improved the shapes of some atomic images, it had the adverse affect of reducing the intensities of the images of many atoms, with some of the weaker images disappearing entirely. When holographically analyzing Kikuchi electron-diffraction data, the small-cone variable axis method should be used with caution and the resulting images should be compared with images produced without the method to ensure that useful structural information is not being discarded.

From our newest Featured Alum

A word about this program —

In 1998, the Physics Department established our "Featured Alum" program. Our goal was to provide our current students with peeks into the array of opportunities which await them after their tenure here at Stetson. We encourage our featured alumni to write an open letter to our current majors (and anyone else who may be interested) to discuss why they came to Stetson, what they found here, and how that has impacted their life after graduation. We've also encouraged them to share anything they wish to regarding their current professional endeavors (a personal biography, web sites, etc…). We have published this information to the Physics web site: http://www.stetson.edu/artsci/physics, and we encourage you to go and browse the page. Archived letters from all former participates can be found by following the links at the bottom of that page. This year, we are pleased to feature our newest "Featured Alum," Garrett Ganroth, here in the newsletter.

You, our alumni, are a distinguished group, and we proudly salute all of you! Please keep in touch with your lives, accomplishments, and goings on — we love to hear how you're doing and what you're up to.

Garrett E. Granroth, Ph.D.

Stetson Class of 1993

Garrett Granroth began his academic career as a Physics major at Stetson University in August of 1989. In the summer of 1992, he worked with Prof. Kevin Riggs characterizing magnetic thin films using primarily the Ferromagnetic Resonance (FMR) technique. He graduated from Stetson University in May 1993. In August of 1993 he began the Ph.D. program in Physics at the University of Florida. He spent five years working with Prof. Mark Meisel on low dimensional magnetic systems and various other systems that have interesting behavior at low temperatures. In 1998 he graduated with a Ph. D. in Physics from the University of Florida. In January of 1998 he started a Post-Doctoral Fellowship in the Center for Neutron

Scattering at Oak Ridge National Laboratory in Oak Ridge, Tennessee. Here he worked with Dr. Stephen Nagler using neutron scattering to study several disordered magnetic systems. In 2000 he joined the Spallation Neutron Source (SNS) project as an instrument scientist. Currently he is managing the design and construction of a high resolution chopper spectrometer named SEQUOIA.

Open Letter:

I was very surprised and honored to be asked to be the featured Alum for this year. I have many fond memories of my time at Stetson. Furthermore, I am truly grateful for the broad base of Physics knowledge that I learned at Stetson. It has served me well during the rest of my career. Every day I use something I learned at Stetson. I will briefly describe my work as an instrument scientist, and the route to become one, followed by a couple of anecdotal incidents where I thought, "I'm glad I learned that at Stetson."

Since July 2000, I have been on staff with Oak Ridge National Laboratory as an Instrument scientist for the Spallation Neutron Source. My job involves the design and project management of a high resolution chopper spectrometer known as SEQUOIA. The

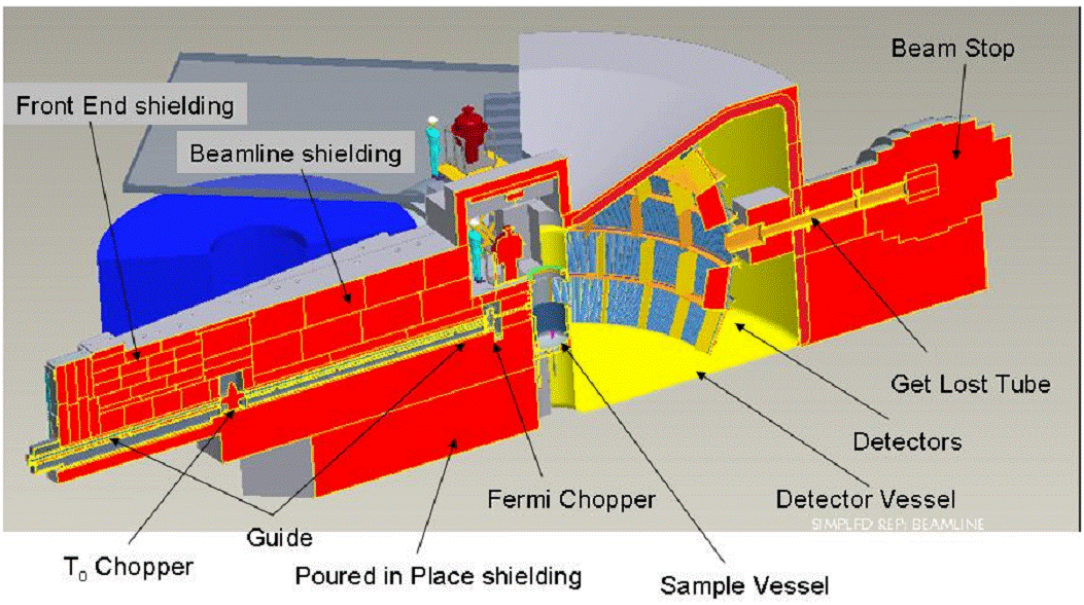

Figure 1 — Baseline Design of SEQUOIA spectrometer

instrument will use neutrons to probe excitations in different condensed matter systems. Neutron Scattering techniques have provided insight into the structure and excitations of almost every condensed matter system that exists and are specifically useful for studying magnetic systems and systems where Hydrogen is important. Neutrons are difficult to generate and national scale facilities are required to provide sufficient quantities incident on a sample. The SNS will be the brightest pulsed neutron source in the world. Because neutron beams are a scarce resource, the first step in the life of a new instrument is a detailed instrument concept showing that the instrument will provide the maximum

scientific output. After this conceptual design is approved the instrument moves into a conventional design and construction phase. My job has been to perform the scientific design of the instrument, shepherd it through the approval process, and currently involves overseeing the conventional design and construction phases. The approved design is shown in Figure 1. Figure 2 shows the lead engineer David Vandergriff and me by components that were installed in Dec. 2004.

Throughout this process both the analytical, computational, and experimental skills that I acquired at Stetson are used on a daily basis. The skills learned through my research experience with Prof. Riggs are so integrated in my daily process of operation that it is

Figure 2 — Garrett Granroth (Left)
and David Vandergriff (Right)
by components for the SEQUOIA shutter

hard to detail. Everything from knowledge of magnetic sample characterization techniques, to thin film preparation, to removing acetone residue with ethanol are skills I use on a daily basis. From my class work, I recently looked back at notes from Prof. Lick's Mechanics II class and Prof. Branton's (Math Department) Differential Equations class for techniques on simulating neutrons in a chopper.

Prior to joining the SNS, I was a postdoctoral fellow for Oak Ridge Associated Universities. Specifically I worked with Dr. Stephen Nagler on Neutron Scattering studies of several magnetic systems. In this work I used primarily the Triple-Axis

spectrometers at the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory. My research also took me to perform experiments on spectrometers at the ISIS facility near Oxford, UK and the NIST beam reactor in Gaithersburg, MD. It was during my post doc that I gained the specific experience in neutron scattering to obtain my present position.

My PhD studies were performed at the University of Florida under the tutelage of Prof. Mark Meisel. Mark and I met at an SPS zone 6 meeting where I presented my FMR work from Stetson. The experimental skills that I learned at Stetson allowed me to quickly become an integral part of his research program. I specifically studied problems in low dimensional magnetism. At Florida, I expanded my experimental skills by using the

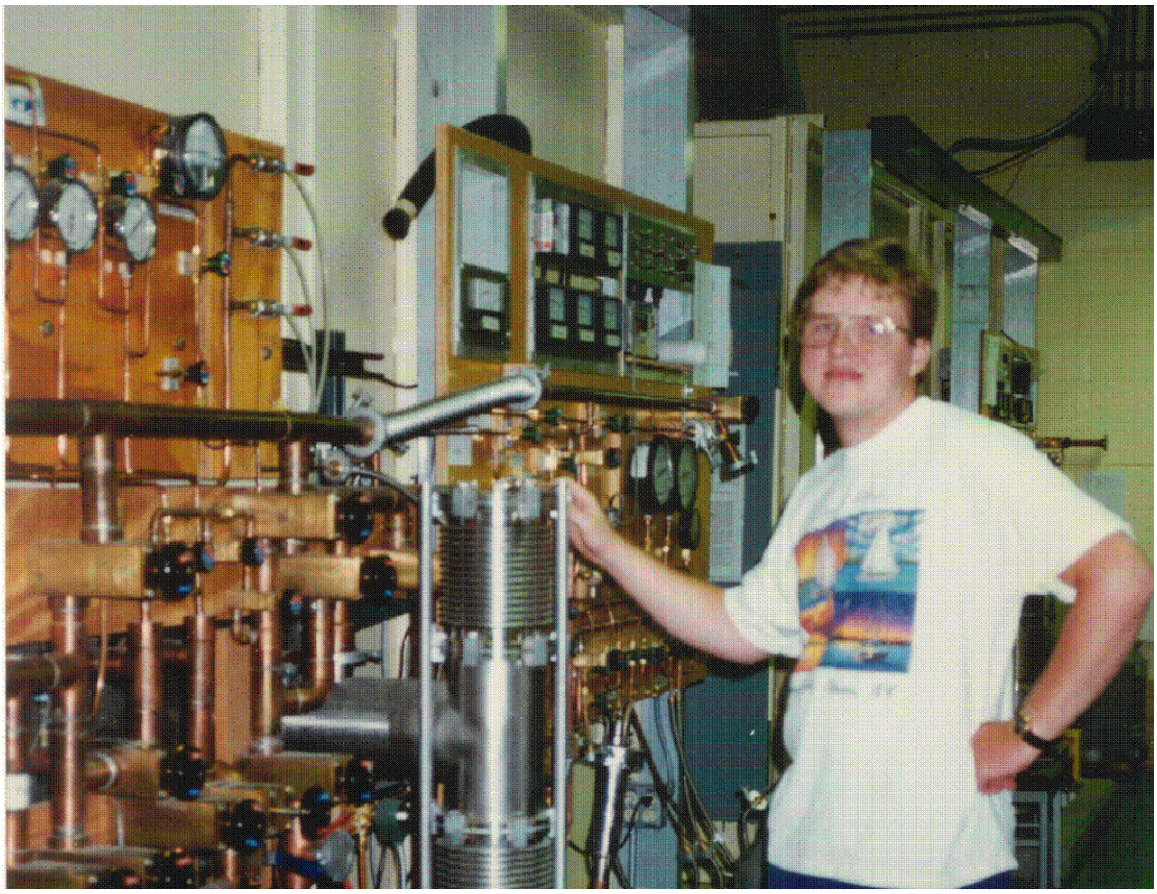

Figure 3 — Garrett checking the controls of the Cryo-2 microKelvincryostat during a Liquid He transfer. University of Florida MicroKelvin Facility, 1996.

lowest temperature cryostats in the mi croKelvin Facility, the high magnetic fields at the National High Magnetic Field Laboratory in Tallahassee,
FL and just about everything in between.

The culture of Prof. Meisel's research group included interdisciplinary collaborations with scientists across the campus and worldwide, frequent presentations at national and

international meetings, and a strong encouragement to get on with my career beyond graduate school. My participation in this highly productive scientific environment, provided additional skills useful later in my career.

That pretty much summarizes my path from Stetson to the SNS. When asked to write this open letter, a couple of specific anecdotal stories came to mind that illustrate how I have used knowledge I gained at Stetson.

In my summer research work with Prof. Riggs at Stetson University, I spent the majority of my time working with a rotational stage for the X-Band electron paramagnetic resonance (EPR) spectrometer in order to use it for Ferromagnetic Resonance (FMR) measurements.

Part of my graduate work involved examining the S=1/2 ends of S=1 magnetic chains. This work involved the analysis of EPR measurements taken in collaboration with Prof. Talham's Chemistry research

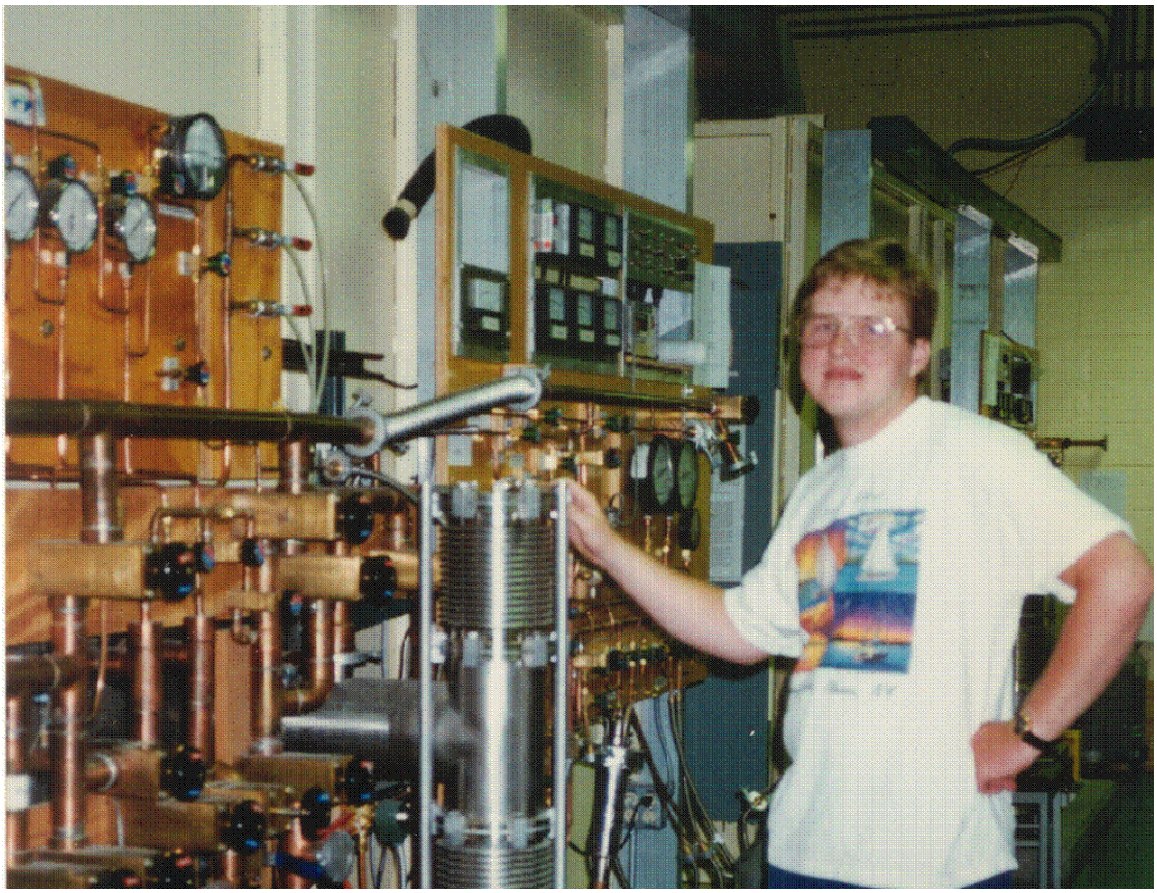

Figure 4 — The X- Band EPR spectrometer at Stetson University in 1992

group. My Stetson experience with this type of spectrometer was helpful in the analysis process. The work resulted in the article; Physical Review B 58, 9312 (1998).

On Friday of the first week of August 1994 I sat down to take the Quantum Mechanics Qualifying exam for the Ph. D. program at the University of Florida. This test was the last of four ½ day qualifying exams. One of the problems dealt with the wavefunction of a cooper pair in a superconducting cylinder. As I examined the problem, Dr. Jusick's voice from Math Methods rang in my head, "Always pick the appropriate coordinate system for the problem." So I started methodically working out Schrödinger's equation in cylindrical coordinates, expanding the solution in a series of Bessel functions and low and behold it worked! The extensive work on solving partial differential equations in several coordinate systems in Dr. Jusick's Math Methods course has been invaluable on the qualifying exam and throughout my graduate and professional career.

In Summary, my Stetson experience has been helpful in many places along my career path. Not only the class work, but also the research experiences and the opportunities to present that research, have provided me with tools that I use on a daily basis in my job as an instrument scientist at the Spallation Neutron Source.

Best Wishes,
Garrett Granroth

From the Faculty

KEVIN RIGGS, *Chair*:

The arrow of time points relentlessly forward and it is time for yet another edition of the Stetson Physics Department newsletter. The good news this year is that I am finishing up my fifth and final year as department chair. It will be a pleasure to turn over the reins to the very able Dr. George Glander. As mentioned in the 2004 newsletter, my research has been focused recently on resurrecting the TV holography (ESPI) lab last worked on by Todd DuBosq ('01), who is now working on his Ph.D. in physics at the University of Central Florida. My current research student, Paul (Wes) Langston ('05) has done a fine job getting everything back in operating condition, including major improvements to the optical table legs and to the optical setup itself. We are currently working on a method to improve the resolution of the TV holograms using speckle pattern averaging.

Last spring I had the pleasure of teaching the second semester of our flagship course, PS202 - University Physics, while Dr. Glander was on sabbatical. This course lays the foundation for all that follows, so it is quite a daunting task to make sure that our students are exposed to all the material they will see again in a more sophisticated way down the road. I also was able to use our new optics lab to the fullest when I was teaching PS306 - Optics, as we now have four optical tables with legs connected to a compressed air source, which makes any kind of interferometery experiments much easier and more successful.

This past fall I taught our newly revised modern physics course for the first time. We have added a new course in introductory quantum mechanics, so Modern now includes a survey of nuclear and particle physics, whereas the quantum and atomic

physics we use to do in Modern has been moved to the new course (which I will teach for the first time next fall).

I have been working on issues related to undergraduate research nationally in my participation with the Council on Undergraduate Research (CUR). I have been busy reviewing articles for the CUR-Quarterly newsletter and I also chaired panel discussion on "How to get a job at a Primarily Undergraduate Institution" at the National CUR conference at UW-La Crosse last summer (which was just down the river a bit from my undergraduate alma mater, UW-River Falls). I stayed on campus in the dorms, which brought back many memories, as the La Crosse dorms were virtually identical to those at River Falls. Even the cafeteria was essentially identical. After the conference I was able to visit some friends from my time at River Falls that now live in the Minneapolis-St. Paul area. Our best friends in the area had just moved to a house on a lake, so much time was spent boating and enjoying the outdoors. They also threw a surprise reunion party of old friends in the area, so the visit was highly enjoyable.

I have also been very active on campus promoting undergraduate research as chair of the undergraduate research committee that oversees the Stetson Undergraduate Research Experience (SURE) program and the undergraduate research symposium, now called the Undergraduate Scholarship Day (USD).

As mentioned in the introduction to this newsletter, we graduated four students last year. While we are proud of all our recent graduates, one of our graduating seniors last year, Jonathan Gosnell ('04), gained national recognition by having his SURE research project titled "Imaging Magnetic Domains via Magnetic Force Microscopy" accepted for the Council of Undergraduate Research sponsored "Posters on the Hill" event. Jon and I traveled to Washington DC where he presented a poster on his research project on Capital Hill. Jon was one of about 70 students selected nation wide across the sciences and one of only seven selected in physics. Jon is currently in the Ph.D. program in Material Science and Nanotechnology at Vanderbilt University with a full fellowship from the National Science Foundation. More about this in the research corner section of the newsletter (p. 3).

I am sorry that I have no tales of travel to exotic overseas locales to regale you with this year. However, my sister-in-law got married in Seattle last summer (a beautiful out-door wedding, by the way), which also gave us a good excuse to go visit my brother-in-law and his family in Fairbanks, Alaska. As it was the summer, the midnight sun made any hope of seeing the Aurora Borealis impossible. We did see lots of wild life, including moose, caribou, mountain sheep and much else on a train trip we made to Denali National Park. Unfortunately, Mt. McKinley was fogged in the whole time we were there, but we did see it from the air as we flew up to Fairbanks from Anchorage. Just last Christmas we went out to visit relatives in Seattle again, and we made a very nice side trip to Mt. Rainier National Park (and also a trip up to Vancouver, BC). Driving up to the Paradise overlook in a snowstorm tested all my dormant winter driving skills learned from many years in Wisconsin and Minnesota (skills that have atrophied during my almost 20 years in Florida).

—Kevin

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GEORGE GLANDER

Greetings!

Last year was very different from the usual because of my sabbatical leave during the spring semester. I continued my research with a new method for analyzing electron diffraction from crystalline surfaces. I finished evaluating some modifications to the method that a theorist had made, and wrote it all up in a paper. I nudged the paper through the submission and review process through the summer and into the fall. It was finally published in December in the Journal of Applied Physics. A copy of the abstract can be found in the "Abstracts" section, on page 4.

It was good to get back to teaching in the fall, although the interruptions caused by the hurricanes made life difficult. I had 23 students in University Physics, which was the biggest group we've had in several years. They were a fun bunch to teach. Sixteen of them have enrolled for the spring. Four or five of them are expressing an interest in being physics majors, while the others are interested in math, computer science or chemistry.

Life is never dull or boring at home, either. I've embarked on the more practical aspects of physics, once again tearing into our house. This project is a little more extensive than the deck I put on a few years ago – it involves another deck leading up to the front door, but it also involves changing which side of the garage has the garage door and raising the part of garage roof to get it out of head-level near the deck. We also plan to redo the driveway, new siding, new windows, and new carpet as part of the project. That, by itself, should be enough, but with our house there is always more, including rotten rim joists and the discovery of a (fortunately small) termite infestation. I expect that the whole project to take a year or so…and my engineering skills are definitely being utilized.

Meanwhile, the kids are as busy as ever: Ian is now a freshman at DeLand High School and loving all that means, including participation in their Model United Nations delegation and more theater tech work opportunities. And next summer will see him traveling to New Zealand and Australia with the People to People Student Ambassador program. Beth, now in 7th grade, is dancing as much as ever; she and I have begun a weekly commute to Orlando for one class at Orlando Ballet School and she spends the rest of her time at her studio here in DeLand. Last summer saw her at Universal Ballet Academy's summer intensive program in Washington DC, and we think this coming summer she'll be off to Pennsylvania for another one. Laura spends most of her time after work running here and there for one kid or the other, and when she actually gets a moment to herself at home, she still enjoys sewing; this past summer and fall she got into piecing and tying quilts and really enjoyed herself with those projects.

—George

gglander@stetson.edu
(and Laura's at: lglander@stetson.edu)

TONY JUSICK

Well, here we are again! Time in this kind of environment seems almost to be circular instead of linear as it appears to be in most of the word. That's both good and bad. Time seems to pass more quickly here which is sometimes good but then one

sometimes wonders where it all went? I guess you all have heard that we had a little more rain and wind this year than usual! By the time it was all over I was completely worn out both physically and especially emotionally. The waiting was the worst for me. Over and over and then over again. Once the things finally got here it wasn't really too bad. We lost power for two, two, and then three days. So I foolishly, I suppose, spent a lot of unnecessary money installing a whole house generator that runs on natural gas. It runs everything including the central air conditioning. I'll probably never use it but, oh well, at least it increases the value of the house and the next occupants will benefit. And if they come visiting again next year I shall be living life in as normal a fashion as possible providing the roof doesn't blow off! I also had storm shutters installed. This on the whole makes me feel a lot better although a lot poorer as a result. The price we are willing to pay for the conveniences of modern life and how fragile it all is. I wouldn't have done this if I were younger but my patience has decreased as my hair has whitened. Notice that I did not say that I have any less of it.

This is my first year teaching half time. I teach astronomy one semester and math methods the other and astronomy during the summer session. I am currently teaching math methods. This is my first run through the new one semester course it has become. The prerequisites are now all three semesters of calculus and so I will be starting with ordinary differential equations and proceeding from there. I have made a syllabus but we'll just have to see where we end up and modify it the next time around. I am enjoying this new experience while I collect three separate incomes.

We are all healthy in my family and the grandchildren are now reaching a more interesting stage in their development at three and six years of age. I think the three-year-old girl will soon clean house with her brother, which, I think, is somewhat overdue. We humans never seem to change much, do we? I hope you all are well. It's been a very rewarding life here and the relationships with you have made it more than worthwhile.

—Tony/AJ

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TOM LICK

Those alumni who have moved out of Florida missed a great learning opportunity last fall. All of you know that I value live demonstration of physical principles and love to do demonstrations. I knew the basic facts that were demonstrated to us last semester, but a live visual demonstration always makes the physical principle more concrete. Speaking of concrete, I now have seen the demonstration that yes, concrete is porous, and not only gasses but even water can penetrate through a concrete block given sufficient time and a sufficient driving wind. And also, a 100 mph wind can do four times the damage of a 50 mph wind. Of course, the hurricane is also a wondrous example of the Coriolis Force that can be used as a proof that yes, we are in an accelerated system since we are sitting on a rotating sphere. The direction of circulation of the winds that I observed in the hurricane tells me tells me that as seen from above the North Pole, the Earth is rotating counterclockwise. And who in Florida did not observe the principle of conservation of angular momentum, noting that the speed of the winds increased as the center of the hurricane approached. Of course, there were many demonstrations of

Bernoulli's principle as we noted that a strong wind above a shingle resulted in a lower pressure above the shingle than below, with the result that the shingle was lifted up so that the full force of the winds could catch and tear it. We even observed that the Earth is a decent conductor, with the ability to conduct enough current to blow a large transformer. I am sure that I omitted from this list additional demonstrations of physics, such as why the telephone lines still worked even though lying on the ground (think of Ohm's Law). If you think of additional examples, you can e-mail them to me.

The Biologists also observed many demonstrations in their field. They observed the exponential growth of mold under the right conditions. They noted with concern the small taproot structure of large oaks that made them susceptible to being toppled by a strong wind. And the observation that cooling by evaporation does not occur when the air is fully saturated as when you are sitting in a damp house with no electricity for air conditioning. Yes, as the sales people emphasize, the most important function of an AC unit is humidity control.

Even the social scientists were able to benefit by their real experience in a society with no electricity and almost no gasoline. They gained experience with candles, kerosene lights, and foods that required no refrigeration or cooking except on the open flame of a hearth (or barbeque grill). Some people probably also learned the availability of alternate sources of protein. Our cat disappeared right after the second hurricane.

All in all, it was a great learning experience. I was amazed that all of our students returned after the two-week closure following the second hurricane. I had thought that with all that they had learned from the storm experience they would not feel the need for additional education.

—Tom

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This year's T-Shirt contest:

This year, the dean of the college, Dr. Grady Ballenger, sponsored a college-wide t-shirt contest. Probably partly because of the disruptions of the various hurricanes, it never really got off the ground; other departments expressed an interest, but no other entries were submitted and so we were the uncontested winners. Staying in the spirit of the contest, however, Dr. Ballenger still has plans to display our winning design outside his office in Elizabeth Hall, and he provided a lunch to the Department to celebrate our victory. We hope next year that more departments will rise to the challenge and take us on!

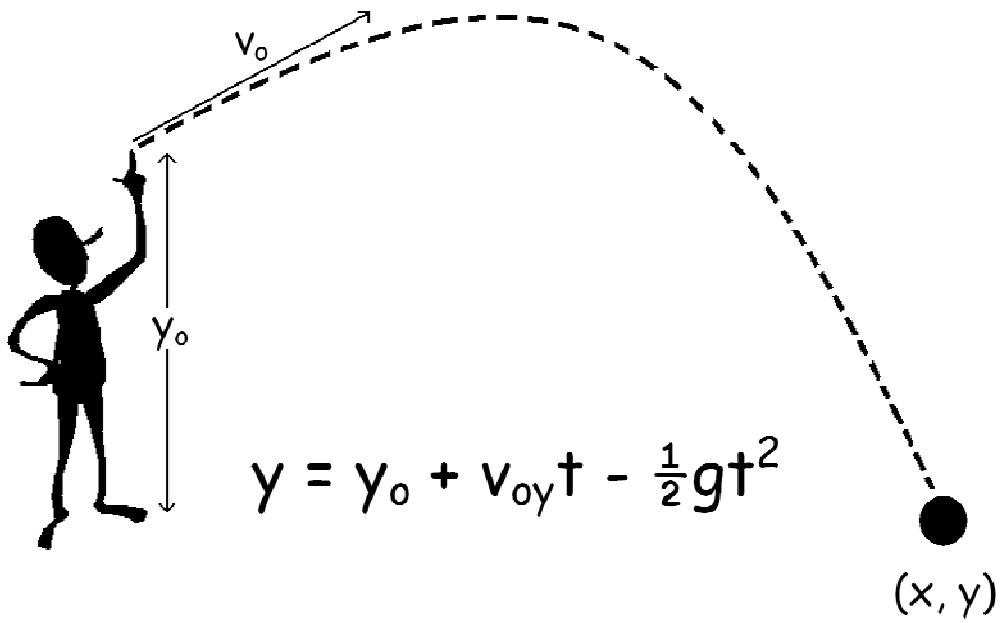
Thanks to Elaine Jahnsen, a freshman in University Physics, for providing the winning design idea, which is done up in a black T with bright, electric blue printing:

On the front:

People always ask me, "Why Physics?"

And on the back:

Well, y_o?



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CROSS SECTION was compiled and edited by Laura Glander, February, 2005.