

CROSS SECTION

Stetson University Physics Department Annual Newsletter, Spring 2004

<http://www.stetson.edu/artsci/physics> physics@stetson.edu

In this issue...

• Area Happenings • From the Dean of the College • Research Corner (our renovations!) • Abstracts • From Our Newest “Featured Alum” • From the Faculty • This Year’s T-Shirt Contest •

Area Happenings

Hello Everyone!

And greetings from the Physics Department! 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 happenings with everyone in the “Alumni News” section (see page 20).

It’s been a busy year for us. First – our students. We had one major graduate last May and another graduate in December. And the graduating class of ’04 will include four physics majors this May. The introductory course, University Physics, had a pretty typical fall enrollment of about 15, and we’re really pleased that the enrollment has remained at that level for this semester. They seem to be a pretty cohesive group of students, and they have been more actively involved in Department happenings than students in this class usually are; many of our t-shirt contest entries came from University Physics students! We hope to glean several majors from the course, which would make for a nice class.

As faculty, we have been re-settling ourselves a bit as we adjust to Tony Jusick’s semi-retirement (he now teaches only one class a semester), George Glander’s sabbatical leave this semester, and the slow integration of our new curriculum (officially the transition to the new curriculum starts in Fall ’04, but we are already thinking in that direction). Fortunately, we’re all pretty versatile so this hasn’t really been a major hurdle for any of us.

Probably the largest upheaval we’ve experienced this year centers around the federal FIPSE grant which has meant a huge influx of new equipment (ranging from all new lab tables, lab stools and computers in all the teaching labs to an atomic force microscope and radio telescope) as well as substantial renovations (primarily, but not exclusively, in our teaching labs) around the Department last summer. The changes have been so substantive that we’ve decided to devote the “Research Corner” article to

showing you, with lots of pictures, what's been going on so you can see for yourself — see pages 3–11 for all the details. We've done some substantial housekeeping as part of the process; and between cleaning out and organizing the old and bringing in all the new, we're very excited about how things look around here. If any of you find yourself in DeLand, do drop by and let us show you around!

As always, we wish you the best in the coming year. Please keep in touch, and drop by if you're ever in the neighborhood...

—Kevin Riggs, Chair
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From the Dean of the College

Alumni and Friends of Physics at Stetson,

Gracious Salutations from your Alma Mater! Physics is the preeminent discipline of change. Whether galaxies in distant space or atoms dancing before our eyes, even seemingly stable things are in constant flux. As lovers of physics, you know about change, and you are well-prepared to visit the labs you knew in Sage Hall and to find them both the same and very different. Unchanged is the devoted work of faculty with students--in formal classes and on senior research projects--and very changed are the lab spaces themselves.

You really won't recognize the old places: new lighting, new ceilings, new lab furniture (including some spiffy optical tables), new technology and instrumentation (notably a radio telescope and an atomic force microscope). This wonderful improvement has been funded by our federal grant, administered by the Fund to Improve Post-Secondary Education (FIPSE) and by our steadfast friends, the Frueauff Foundation.

Even more exciting, these improvements are a small part of a major renovation plan, which will completely renovate the current building and add new laboratory and classroom space. The result will be a new "signature" building for campus, echoing Elizabeth Hall and establishing the biological and physical sciences as centrally important to liberal study at Stetson. All we need, as they say, is money.

As the Stetson moves toward its 125th anniversary and a fund-raising campaign to celebrate that achievement and strengthen the University for the next 25 years, funding this Sage Hall renovation and new construction project will be a central goal. It's a big project, ultimately some \$17 million in construction costs alone, but architects have given us a "phasing" plan that can bring it within reach. I look forward to sharing details with you. Remembering what Stetson has meant to you and what the study of physics can mean to the next generation, I ask that you think about how you can help--with foundation contacts or potential corporate donors, with alumni-fundraising or miracles.

Do stop by to see where change has brought us and to get a sense of the even bigger changes to come.

Best,
—Grady Ballenger, *Dean*

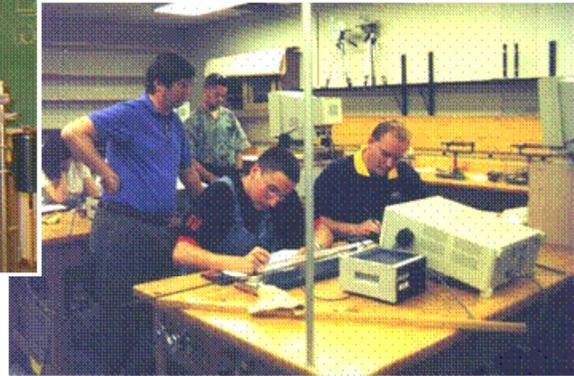
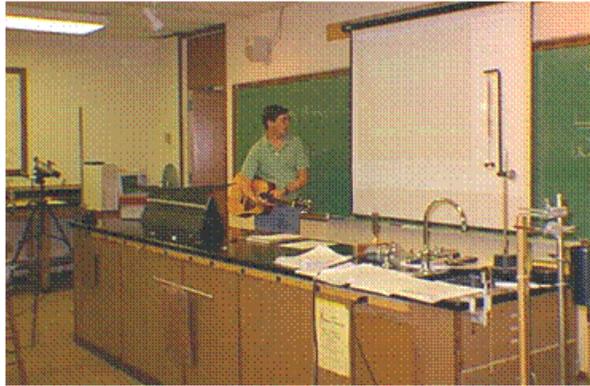


The Garden Wall

An artist's conception of "The New Sage Hall," including the proposed addition.

Research Corner

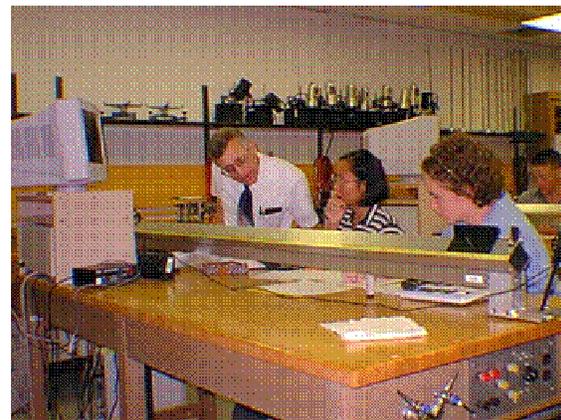
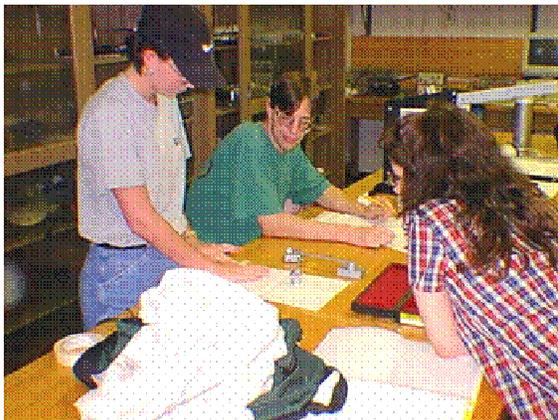
This year, our major efforts have been in refurbishing our labs through funding support from a federal FIPSE grant. New equipment, renovations... It's been pretty exciting stuff. While research continues to be a prime focus of our faculty both for their own professional development and as a means of teaching our students (and it hasn't stopped just because of all the changes which are and have been occurring!), the renovations really have taken top priority in the Department over the past year. We're eager to share what we've been up to — so, we're taking a break from our usual "Research Corner" news to fill you in on all the changes. They say a picture is worth a thousand words, so we thought perhaps a photo array would be the best way to show you all the changes. If we've piqued your curiosity, we invite you to stop by and see things for yourself first-hand. We think we're lookin' pretty spiffy these days!

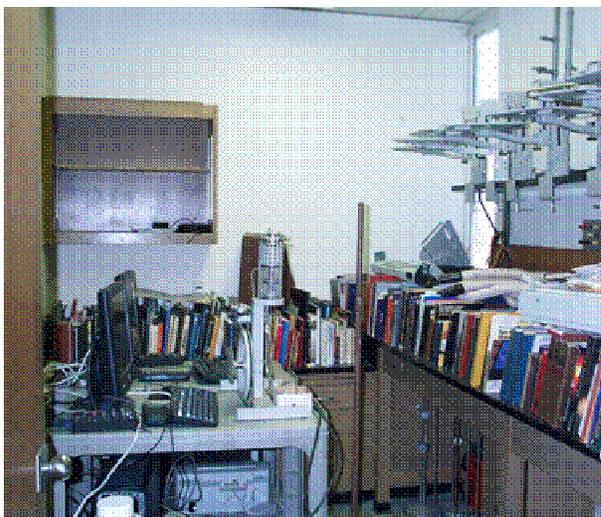


First — Some “before” pictures...

Above — Kevin teaching in the Jenkins' Room (room 213) our primary lecture hall, and in room 217, one of our introductory laboratories.

Below — Upper class majors working in one of the advanced laboratories, and Tom's College Physics lab, which meets in room 215, our other introductory lab.



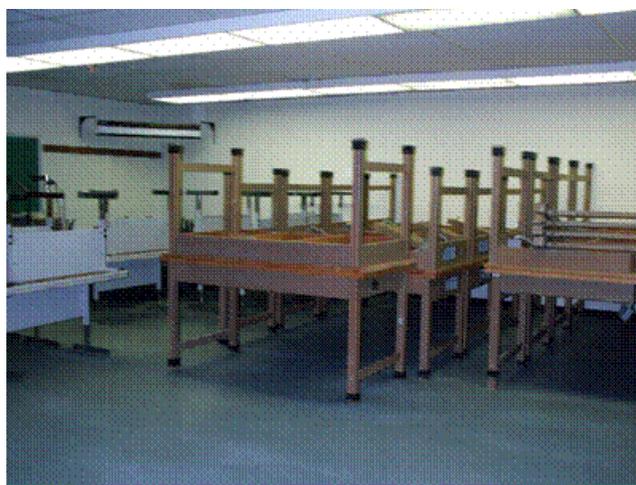
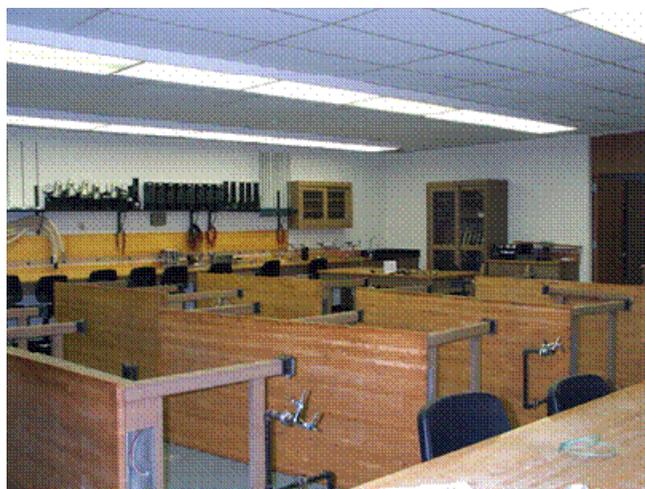


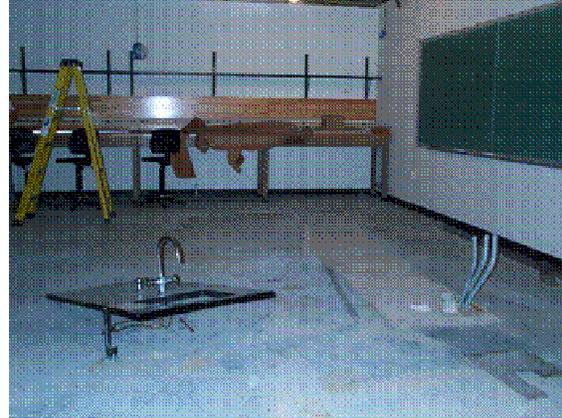
Prepare... and begin.

Left — Everything in the labs had to be removed and stored, somewhere. Student offices became our most valuable warehouse space.

Center — The lab tables were removed carefully. Replacements had been ordered. (This is room 215, an intro lab.)

Bottom — The old lab tables were stored in a Biology classroom; ultimately, our old lab tables would be re-fitted for some of the biology labs, some of the chemistry labs, as well as some of our own research labs; Biology underwent their renovations in December, Chemistry is next.



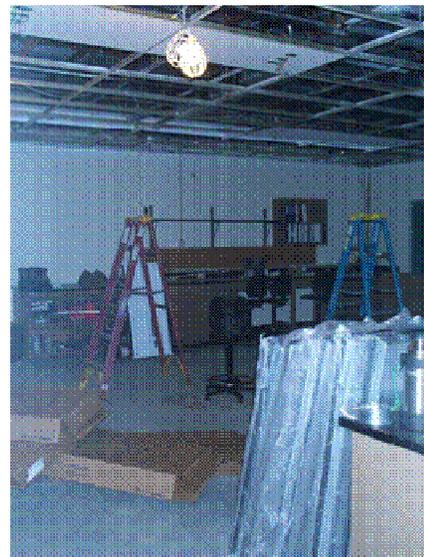
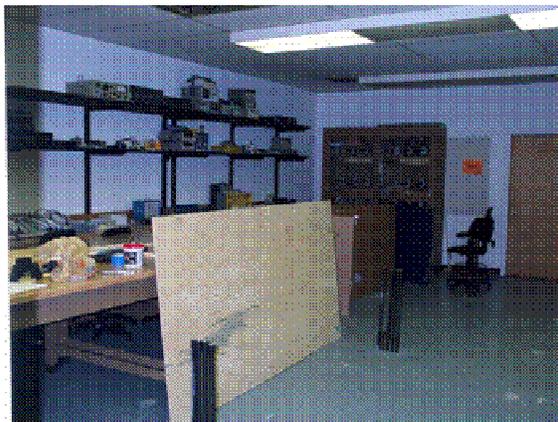


“Destruction”

Above — Once the lab tables are removed, gas and water service needs to be disconnected and removed. This is room 217, an introductory lab.

Left and below — The advanced labs receive the same treatment. Left is room 110, the optics lab. Below left is room 207, the mechanics lab, and below right is room 202, the moderr. lab.

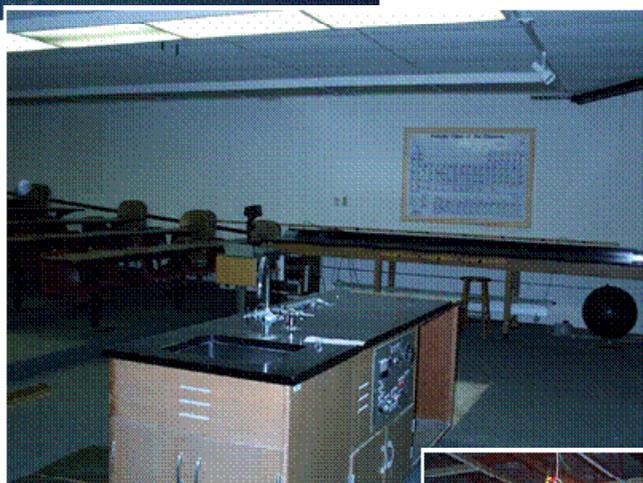
Old lighting fixtures are removed in all the labs and corridors to prepare for new ones.





The George L. Jenkins Lecture Hall

Sage 213



Our primary lecture room was also included in the chaos. The renovations weren't quite as extensive in here, but old lighting was ripped out so that the room could receive new overall fixtures and spotlights to highlight the chalk board up front. A new projector system was installed (similar to what was there before, but updated) in which the ability to use a lap top computer, VCR, and DVD was integrated. Finally, the front demonstration lab table was taken out (which included removing gas and water service) because new, moveable demonstration tables had been ordered. As a result, the carpet in front of the room also needed to be redone...



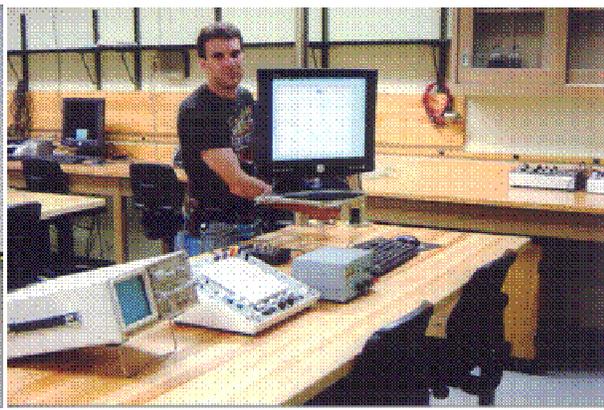
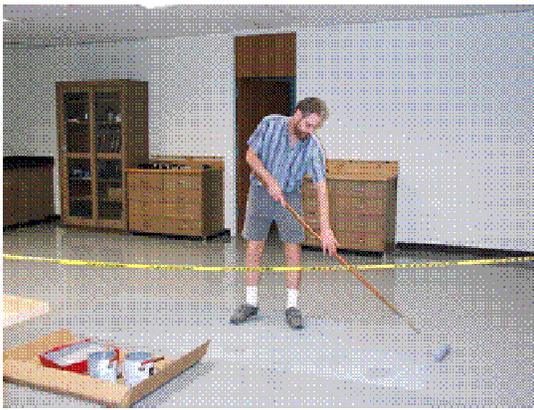
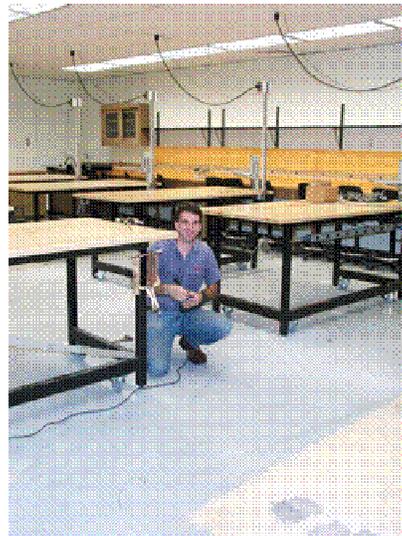
Finishing up...

After the contractors left and the furniture was delivered, there was still lots to be done.

Left — George put three coats of polyurethane on each of the new lab tables.

Below, center — Left, Tom works on smoothing out floors where plumbing and gas fixtures were removed, and right, Larry works on fitting lab tables with electrical fixtures.

Bottom — Left, George repaints the floors in all the labs, and right, Larry finishes up with the electrical fixtures for the tables (By the way, this picture was published in CUR-Quarterly Magazine — see Kevin's personal article in the "faculty news" section).

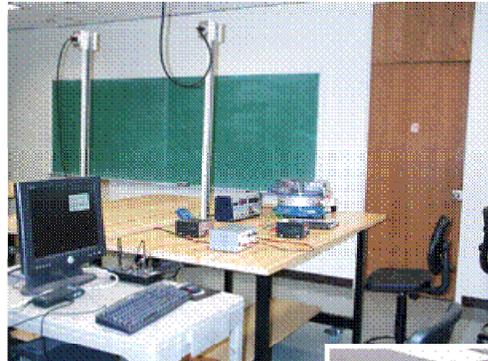




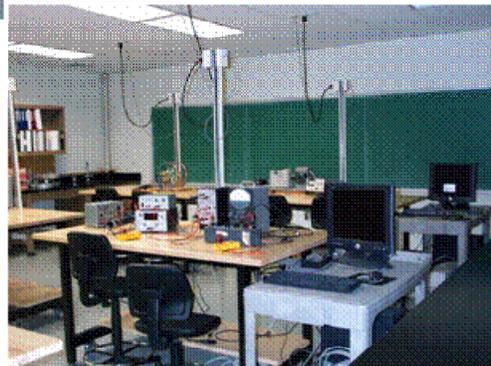
Room 215 — College & University Physics Lab



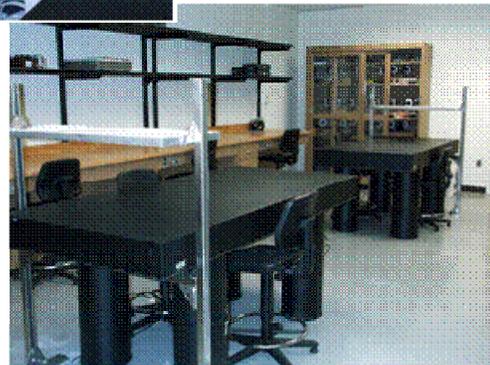
Room 217 — General Astronomy, The Science of Music, assorted other classes, and tutoring



Room 207,
The Mechanics Lab

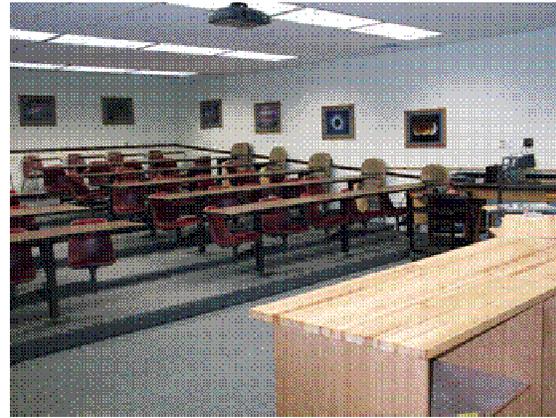
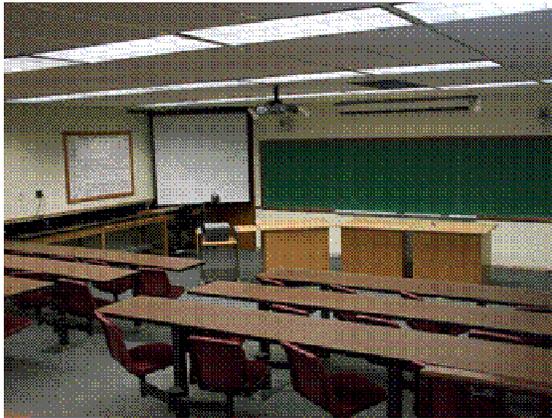


Room 202,
The Modern Lab



Room 110,
The Optics Lab

The Labs are done!

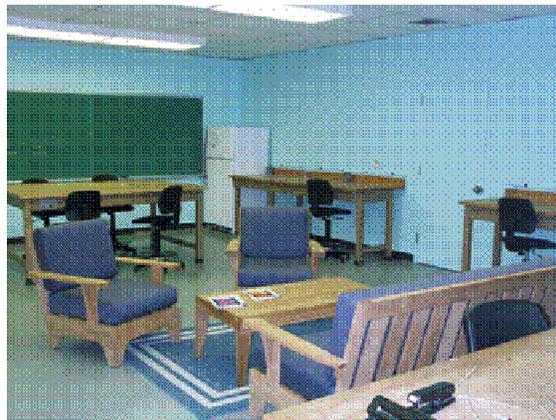
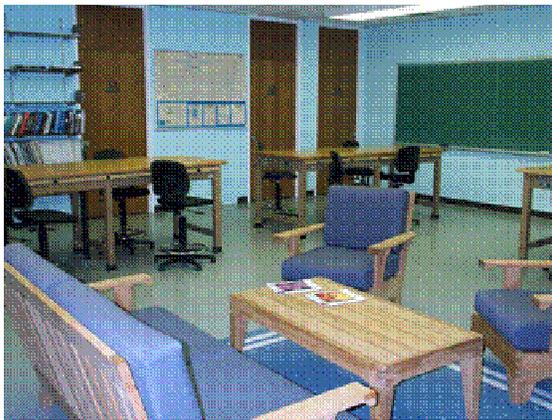


The George L. Jenkins Lecture Hall — Sage 213

Our primary lecture hall and our reading room
look great also!

The Reading Room — Sage 114

A student lounge now shared by all science students, equipped with lab tables, chalk boards, a refrigerator, a microwave, and comfortable lounge furniture. It's a favorite study spot.



If this has piqued your curiosity, please feel free to drop by — we'd love to show you around!

And, throughout all the chaos, student research was still happening...

Our new Atomic Force Microscope

Senior physics major Jon Gosnell was awarded a SURE grant to spend the summer working on calibrating and taking the first data from our new Atomic Force Microscope, the biggest purchase the Physics Department made with money from the federal FIPSE grant. Jon's research was supported by the Stetson Undergraduate Research Experience (SURE) program, with funding provided by the Palm Beach Community Trust. More information on the SURE grant program can be found at the SURE web site: <http://www.stetson.edu/programs/SURE>.

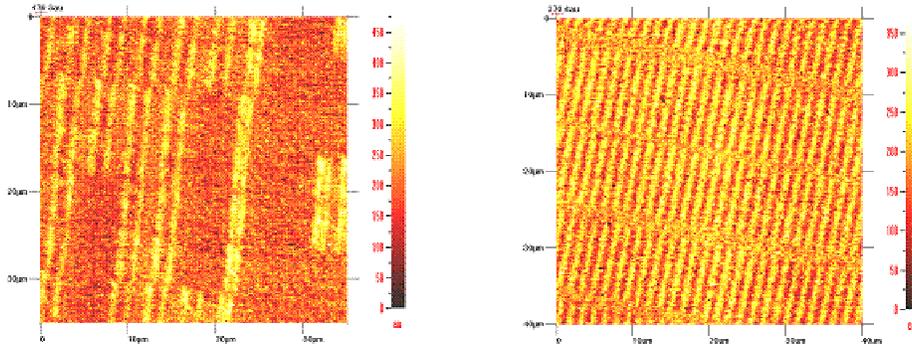
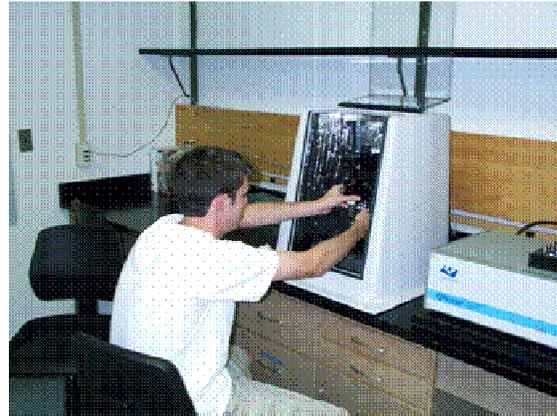
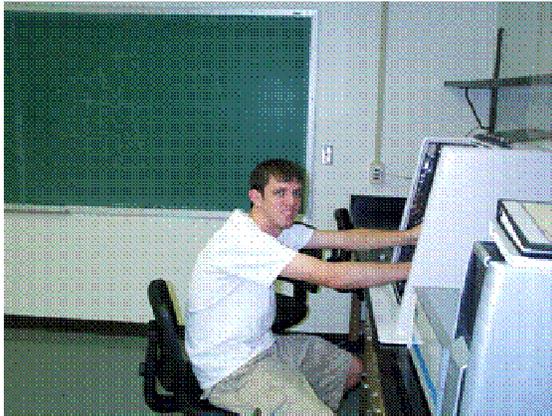


Figure 1. (Left) Magnetic Force Microscopy scan image of a Zip Disk magnetic media sample. Scan size of the image is 35mm x 35mm. The units of the image height are arbitrary. (1 mm = 1 millionth of a meter)

Figure 2. (Right) Magnetic Force Microscopy scan image of a Zip Disk magnetic media sample. Scan size of the image is 40mm x 40mm. The units of the image height are arbitrary. (1 mm = 1 millionth of a meter)





Our new Radio Telescope

Meanwhile, outside of the building, senior physics major Ari Litwin works with our machinist, Larry Ramsey, and Dr. Kevin Riggs, on a temporary mount for our new radio telescope. Ari's senior project was to set up and calibrate the telescope and establish that everything was in working order. Eventually, the telescope dish will be mounted permanently on the roof of the duPont-Ball Library. Controls for the telescope will be housed in one of our research labs.



Abstracts

Below are the abstracts submitted by our senior physics majors for Senior Seminar (PS-499). We salute their accomplishments and wish them well when they head off after graduation. We hope you enjoy reading about what they have been up to...

Development of a Third Generation Piezoelectric Contact Sensor with Applications to Manatee Protection Systems and Remotely Operated Vehicles

Daniel Carlson, Stetson University Physics Department & Larry Taylor, Harbor Branch Oceanographic Institution.

A third generation piezoelectric contact sensor (PEC) has been designed for use in a specific manatee protection system. The unique design of the sensor allows for additional applications, including collision sensing on remotely operated vehicles. Six tentative PEC designs were drawn and dimensioned in SolidWorks. Finite element analysis (FEA) was performed in COSMOS. Combinations of restraints and forces were varied to represent intended uses in the field. Placing a line representative of a piezoelectric sensor in the designs allowed the maximum and minimum strain experienced by the sensor to be plotted. The plots permitted quantitative comparison of the six different sensor designs. In addition to varied forces and restraints, two sensor orientations were considered doubling the number of plots for each sensor design. After comparing strain plots, most models displayed similar magnitudes of maximum and minimum strain for each force applied. The design similarities did not allow an optimum design to be selected from FEA results alone. Other factors, including molding and production, were considered when selecting a prototype design.

The project was funded by the Link Foundation.

Studying the Thermodynamics of Vortex Tubes

Nick Frost & Thomas Lick; Stetson University, Department of Physics.

Equipped with no moving parts and powered by nothing more than compressed air, vortex tube chillers display many thermal and fluid properties of classical thermodynamic refrigeration cycles. The effect of the vortex tube is to generate a temperature (thermal energy) gradient by inducing the transfer of energy from the central region of the flow to the periphery. A fraction of the hot outer stream is exhausted through a needle valve at the end of the tube. The remaining cooled portion of the injected air stream that does not escape is reflected at the hot end and flows back down the center of the vortex tube, exiting through the opposite end as cold air exhaust. A vortex tube can be controlled by altering and varying any of the free parameters that govern its performance: the working fluid; the ratio of specific heats; the input temperature; input pressure; and hot exhaust pressure. By opening the hot air valve, the hot exhaust pressure is reduced which in turn reduces the cold air exhaust temperature. Temperatures, flows, and refrigeration are all adjustable over a wide range using the control valve on the hot end exhaust. Temperature and air flow measurements were taken at specific pressures, and comparisons to other methods refrigeration were made based on the efficiency and performance of the vortex tube.

Analysis of Magnetic Structures via Magnetic Force Microscopy.

J.D. Gosnell & Kevin Riggs; Stetson University, Department of Physics.

Magnetic Force Microscopy (MFM) allows us to obtain high resolution images of the domain structure of a magnetic material. This is accomplished by an Atomic Force Microscope (AFM) where the cantilever tip is coated with a magnetic material. This technique relies on an initial pass measuring the topography and a second pass measuring the magnetic field gradient of the stray fields above the surface. The topographical information is used to keep the probe tip at a constant height above the sample surface. We have thus far imaged the magnetic structure of magnetic media such as Zip disks, hard drives, and floppy disks. The magnetic domains appear as thin stripes in the magnetic image, which correspond to the bits of data. Techniques for reading (and writing) ever smaller magnetic domains will form the basis for future high-capacity magnetic storage media. We have also looked at the magnetic structure of a perpendicular anisotropy Yttrium Iron Garnet (YIG) film sample which has meandering magnetic domains. In addition, we have imaged the magnetic structure of micron-sized ferrofluid particles that are embedded at the surface of a photo-curable polymer.

This project was supported by the Stetson Undergraduate Research Experience (SURE) Program, with funding provided by the The Palm Beach Community Trust.

Jon's poster summarizing his results has just been accepted for presentation at the Council on Undergraduate Research "Posters on the Hill" event in Washington DC on April 20, 2004.

Setting Up the Small Radio Telescope (SRT) and the Galactic Rotation Experiment

Ari Litwin & Anthony Jusick, Kevin Riggs; Stetson University Department of Physics.

The Small Radio Telescope (SRT) is a radio telescope kit designed and sold by Haystack Observatory (<http://web.haystack.mit.edu/SRT/>). The set-up and troubleshooting process of the installation of the SRT at Stetson University will be detailed, as well as its use in running the Galactic Rotation Experiment. The Galactic Rotation Experiment makes use of the 21-cm hydrogen line to ultimately construct a graph of the rotation of the Milky Way galaxy with respect to distance out from the galactic center. The generated plot, shows that velocity does not depend on distance out from the galactic center (and thus does not follow Keplerian motion) out to the distance of the Sun (about 8 kpc). This shows that there is significant mass outside the galactic center.

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) which discusses 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> (choose “Featured Alum” from the choices on the left), and we encourage you to go and browse the page. Archived letters from all former participants can be found by following the links at the bottom of that page. This year, we are proud to feature our newest “Featured Alum,” Amy Johnson, 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.

Amy E. Johnson, M.Ed., M.S.

Stetson Class of 1996



January, 2004

Open Letter to Physics Majors:

As the first woman and high school teacher selected, I am honored to be chosen as the Stetson Physics Distinguished Alum for 2004. You may be asking, as I often ask myself, how in the world did I end up teaching physics (and coaching cheerleading!) at a suburban high school outside of Chicago?!? Well, it’s an interesting story...

In high school, I was equally successful in all my subjects, although I much preferred Math and Science over English and History. My senior year, after taking a class at Fernbank Science Center in Atlanta, I decided that I wanted to be a college astronomy professor. However, I had also decided to attend Stetson, a small university that did not have an astronomy major. So, having never taken a high school physics class, I became a physics major in order to reach my goal! Fortunately, I enjoyed it very much and after graduation, I decided to head back to Atlanta to attend Georgia State University as a graduate student in the Astronomy Ph.D. program.

Much to my surprise, after about 6 months, I realized that my interest in Astronomy had waned, to the point where I couldn't see committing the rest of my life to it. Luckily, I was enjoying the teaching aspect of being a graduate assistant, therefore I applied to and was accepted into a program at Georgia State that allowed undergraduate science majors to get their Masters of Education in 1 1/2 years. My advisor in Astronomy let me continue teaching and taking classes to also receive my Master of Science in Physics.

So, in August of 1998, armed with two Masters degrees and a couple months of student teaching, I became the first physics teacher at Wesleyan School, a relatively new private Christian school north of Atlanta. While my two years teaching and coaching there were a great experience, I discovered that in order to be a better teacher, I needed two important things: one, a larger, more-established school that would not require so much of a time commitment outside of class, and two, an experienced physics teacher to mentor me. I decided that I needed to leave Wesleyan for greener pastures, but I had no idea where to find those pastures. At a conference for the American Association of Physics Teachers in January of 2000, I met another physics teacher by the pool who taught in the northwest suburbs of Chicago. I fondly remembered my times in Chicago when working at Argonne Lab in college, and had long ago decided that was the one city besides Atlanta I could see myself living in. Within three months of that meeting, I had sent off my resume to Illinois, flown up for an interview, and accepted a job teaching at Wheeling High School, about 30 miles northwest of downtown Chicago.

I am now in my fourth year of teaching and coaching at Wheeling, hoping to receive tenure at the end of this school year. Wheeling is an ethnically diverse community with dedicated teachers. The physics teacher I work with has been teaching here for 30 years! Working with him, and the other physics teachers in the area, I have been able to bring new ideas, demos, and teaching methods to my classroom to make it a more interesting, educational, and fun place to be, for both the teacher and the student. Every year we take a huge group of students to Six Flags Great America, where they successfully apply the physics concepts they've learned throughout the year. In addition, this will be the second year for our program, Physics is Phun Phor Parents- a 3-night class where the parents of current students can learn basic and fun physics concepts. I don't know if I will teach for the rest of my life, but for now it gives me great joy to (hopefully) positively influence the lives of high school students, whether inside or outside of the classroom.

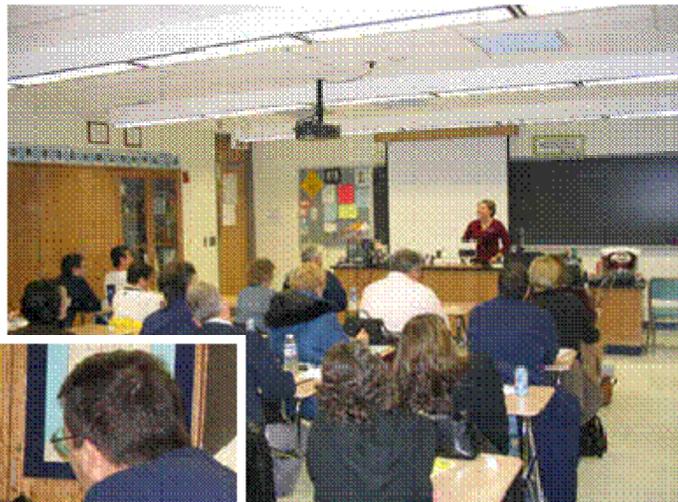
So what's the point of this whole long-winded story? I guess my big piece of advice is to stay open-minded and amenable to change. Growing up, I never would have pictured myself as a high school teacher, but now I can't imagine doing anything else. We are a strange and rare breed, those of us who are intrigued by math, physics, problem-

solving, and delving into why things do what they do. I think that it is a real gift to be able to share a love of all things physics with other people, whether they are a student, parent, or another teacher. No matter if you go into research, industry, or education, remember that it's up to us the spread the knowledge of how things work and why. Good luck in all of your future endeavors, and remember...***Physics is Phun!!***

—Amy

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This picture of Amy teaching was taken at Wheeling H.S.'s first ever Physics is Phun Phor Parents night in January, 2004.



This picture of parents checking out infinite images of mirrors was taken at Wheeling H.S.'s first ever Physics is Phun Phor Parents night in January, 2004.

From the Faculty

KEVIN RIGGS (Chair)

Now that I think back on the past year, it is amazing to contemplate all the changes that have occurred in the department since our last newsletter. The biggest changes occurred in our teaching laboratories and in our main lecture room due to funds from the \$2.5 M grant for Sage Hall improvements from the federal Department of Education. Since we have devoted the "Research Corner" article in this newsletter about all the renovations (pg. 3), including lots of before and after photos, I will not go into detail here. It was a lot of fun to show off our new lab spaces to the president of the University, Dr. Lee, when he toured the department last month.

In the spring of 2003 I taught another edition of my course on musical acoustics titled "The Science of Music". One of the things I love doing in this course is demonstrating real musical instruments for the students. Of course, this means that I need a large collection of musical instruments, and more importantly, I need to learn how to get something approximating a musical sound out of them. Currently I have been focusing my efforts on the plucked string family. I recently bought a banjo to add to my collection of three electric guitars, two acoustic guitars, and a mandolin. My next acquisition should probably be a fiddle, so I can branch out into the bowed string family (and perhaps start a one man blue grass band). I was also able to use part of the grant money mentioned above to equip the computers in the acoustics lab with FFT spectrum analysis cards and software from National Instruments.

One of the major pieces of equipment that I mentioned in the last newsletter is our new atomic force microscope. Senior physics major **Jon Gosnell ('04)** obtained a Stetson Undergraduate Research Experience (SURE) grant to adapt the microscope for use as a magnetic force microscope. He was able to image the bit patterns of commercial hard drives and zip disks and also imaged the interesting domain pattern of a Yttrium Iron Garnet thin film (see page 10 in the "Research Corner" article). He will be presenting a poster of his work in Washington D.C. next April in the Council on Undergraduate Research sponsored event, "Posters on the Hill". He will find out in February whether his poster has been accepted.

The other research project I helped supervise was the installation of our new radio telescope. Senior physics major **Ari Litwin ('04)** managed to get the telescope up and running on a temporary test stand located on the west side of Sage Hall. Many people passing by thought we were installing a new satellite TV dish. Of course their confusion was understandable since the telescope is adapted from a commercial dish, ironically the same model that Tony used to have in his back yard. Eventually the dish will be located on the roof of the library, close to her TV dish cousins, but our dish will tilt toward various astronomical radio sources under control of a computer located in Sage Hall (with the aid of a radio modem link to the telescope).

Next summer, I hope to resurrect my dormant TV holography system for imaging the vibration modes of musical instruments which was first developed by **Todd DuBosq ('01)**, and perhaps continue with the MFM experiments started by Jon Gosnell.

In the fall of 2003, I had the pleasure of teaching our electronics course. This course covers both analog and digital electronics. I took the plunge into a new set of

textbooks, since the text I was using was getting a little out of date considering the fast moving pace of modern electronics. I was able to do all of my lectures as computer presentations that incorporated computer simulations of various circuits using the successor to Electronic Workbench called Multisim. I also took the opportunity to completely revamp the laboratory component of this course to better match the material discussed in class.

In an effort to raise the profile of our natural science programs (especially physics) among area high school students, I solicited invitations to speak at three area high schools, DeLand High, Sea Breeze High (Daytona), and Pine Ridge High (Deltona). It was especially enjoyable to visit Pine Ridge High where one of our own graduates, **Yuri Brubach ('02)**, is currently teaching physics. I presented a talk titled "Seeing the Small Picture: The Nobel Prize Winning Technology of Scanning Probe Microscopy" which focused on our scanning tunneling microscope (STM) and atomic force microscope (AFM). Since our STM is very small and portable, I also brought it along to demonstrate to the audience. All totaled, I spoke to roughly 500 kids in classes ranging from AP Physics to Anatomy and Physiology. I hope to make these high school visits an annual event and I really hope that they pay off with increased enrollments in the future. Of course, you can also help us recruit good students by mentioning to anyone with college age kids interested in physics or engineering that Stetson indeed has a strong physics/pre-engineering program. Have them check out our website at www.stetson.edu/artsci/physics/.

As you know from previous newsletters, I have been an active member of the Council on Undergraduate Research (CUR). Recently I was appointed the physics/astronomy division editor of the CUR-Quarterly. Of course, I was assured by the chair of the division that my job would be to solicit articles of interest to physicists supervising undergraduate research and to occasionally referee submitted articles, but not to write articles myself. Imagine my surprise when attending the first editorial meeting at the national conference when I was informed that my first responsibility as editor would be to write an article about US physics department support staff using data from a recently done e-mail survey. The article appeared in the December issue of the CUR-Quarterly and features a photo of our machine shop technician, Larry Ramsey (see page 7 in the "Research Corner" article). Larry is quite camera shy, so it was fun for us to tease him about his newly found fame.

On a more personal note, some of you will recall that I had cataract surgery done on my left eye three years ago. My left eye was corrected with a fixed focal distance of about 50 cm, but my right eye was very near sighted and so the magnification difference upon correction was very difficult for my poor brain to handle. Thankfully, my right eye progressed enough so that I was able to have it corrected last fall. Now I can see quite well, even without my glasses, which I only really now need for reading. Since I have been wearing glasses since about third grade, this has been a very liberating experience.

—Kevin

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GEORGE GLANDER

Greetings!

Once again, it's been a busy and productive year. In addition to the usual but always important teaching, it has been a mad scramble dealing with the renovations to our classrooms and labs, and integrating in the new laboratory equipment we have purchased. I spent the spring and beginning of the summer cleaning house, throw out old and out-dated equipment, and stripping everything out of the labs so the contractors could do their renovation work. I salvaged cabinetry and tables which were to be removed and replaced, and reinstalled them elsewhere, mostly in our research labs. Just to keep life from being boring, it was less than two weeks before the start of Fall classes when the new lab tables arrived and the contractors finally finished their work in the labs. That did not give us much time to install the new electrical service to the tables and move all our equipment back into the labs, but we managed. The result of all this is that all five teaching labs are looking great and we now show them off with pride to any visitors who come through the Department. It's really satisfying to see how nice things are looking around here.

During the fall, I had a good group of about 15 in University Physics. They were a more cohesive group than we usually get in an introductory class. Among other things, they submitted lots of entries to our t-shirt contest, and in fact the winning design came out of that class! Unlike most years, nearly everyone who was in the first semester has decided to take the second semester course – this time it's with Kevin, though, as I'm currently on sabbatical leave. Kevin's borrowed my notebooks, however, so while his teaching style is different from mine, the course is essentially the same. I'm hopeful that we'll hang on to the declared majors in the course, and maybe even pick up one or two more.

And speaking of my sabbatical, I'm enjoying the change of "scenery" which now has me popping into the Department periodically, but for the most part I run dueling computers at home – one doing massive number crunching jobs, the other where I analyze the results. I am continuing to investigate a new way of analyzing low-energy electron diffraction data. It allows the researcher to invert the diffraction data directly to obtain an image of the atomic structure in the top few atomic layers of a crystalline sample. I am not very far into the project yet, but the work seems to be progressing well. I will write up a more comprehensive article for next year's newsletter.

Meanwhile, Laura and I are now the parents of two middle schoolers and all that involves. DeLand is small enough that we have not had to drive very far to get Ian to karate, piano lessons and Children's Choir rehearsals, and to get Elizabeth to her many dance classes each week. Laura and I often wonder how families manage to get everyone where they need to go when the children outnumber the parents.

We vacationed in Minnesota right on the Canadian border at the edge of the Boundary Water Canoe Area. We paddled canoes, road horses, saw lady slipper (the Minnesota state flower), caught big fish, gazed at the Milky Way, and saw the northern lights dance. It was a delightful trip.

Laura and I hope you are all well. Drop by if you're ever in town! And do take care...

—George
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TONY JUSICK

Well, here it is 2004. Time really seems to fly when you're in an academic setting. A contribution, no doubt, of the effects of special relativity and the cyclic characteristics of nature. So much for my yearly analysis of the effects of physics impinging upon the reality of at least my world.

I suppose the big news for me at least is that I have half retired. I now have a special title. Sorry I can't remember it but the net effect is that I teach one course per semester instead of two, I work one half day rather than full, they pay me one half salary, and I get to play some extra golf. I taught math methods last semester to two students. It was fun and this semester I am teaching astronomy to 35. Ken Everett from the chemistry department and I shared a retirement party hosted downstairs in our section of the building and we both received some nice gifts and going away salutations. I felt a little weird as I have only gone half away. I hate to let go of this place to tell you the truth. I have spent the greater part of my life here. This is my 38th year. It was truly the right place for me to be and I have truly enjoyed the time I have spent here and the things I have done. Not so much the things I have done but the students and faculty I have interacted with over the years. All in all it has been a very rewarding life for both me and, I hope, for others as well. In many cases the interactions with people have been just as beneficial to me as to those I was assigned to mentor and I truly mean that.

I had a little case of prostate cancer which was concluded successfully this past year. Finished up with a radioactive seed implant after having experienced 25 external beam treatments. Missed one day of class during the whole ordeal which took place during prime teaching time not during vacation time. Not bad. If you know anyone who is afflicted with this be sure to advise them to study the whole situation carefully before they select a treatment plan. There are a number of different routes one can go but it seems to me this was one of the better ones.

I also got a new car! A 2004 Nissan Maxima. Burgundy red with automatic transmission and 265 horses under the hood. A beautiful car and drives like a dream. I have had it eight months now and it's a pleasure every time I get behind the wheel. I think it's the best car I have ever had. It's truly a thrilling driving experience. Of course if you're just interested in getting from one place to another it's probably not for you. But if you love to drive then try it out!

I buy and sell a lot of golf clubs on ebay. Gives me a chance to try them out. I sell most of them back at some loss but the whole process is kind of fun. The post office must think I'm running a golf store.

Well, I hope you have all been prospering. Happy New Year and as they say many happy returns.

—AJ

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TOM LICK

I readily admit that over the years I have looked at the other fields of scientific inquiry with a distinct air of superiority. All of you who have been in one of my classes can attest to this fact. I have usually been quick to point out the subjective nature of much of the research in the social sciences and the lack of control of variables that could influence the

results obtained. I have also pointed out how the preconceived beliefs of the investigator influence the results in these areas. The above considerations do color the results obtained but do not constitute outright fraud. There have however been numerous cases of outright fraud with many of the recent cases involving medical research. Because of the expense and difficulty of replicating much of this medical research, this fraud is seldom caught since the research is not replicated. But the area of physics has seemed to be almost free of cases of scientific fraud.

Physicists have been able to identify and control all the relevant variables in their experiments, and the numerical results of measuring apparatus were not subjective. The relevant parameters were published with the data and as a result the experiments were replicated by other researchers. It is this ability to replicate the experimental results that gives Physics its objectivity. The major exception that springs to mind is the French Scientist Rene Blondlot who in 1903 claimed to have discovered N-rays. But Blondlot was not committing conscious fraud. Instead his was a case of self-deception due to his use of a subjective measurement technique.

But this year has been a major embarrassment for Physics with two major cases of fraud being uncovered at two premier labs. The first was at Lawrence Berkeley National Laboratory where a Nuclear Physicist, Victor Ninov, was found to have fabricated data used to prove the creation of the heavy element 118. The second case was at the world famous Bell Labs (now Lucent Technology's Bell Labs) where the very prolific researcher Hendrik Schon was found to have fabricated data for 16 out of 24 papers he published over a two year period. Schon was even set to assume the position of co-director of the famous Max Planck Institute at the extremely young age of 32 when the fraud was uncovered.

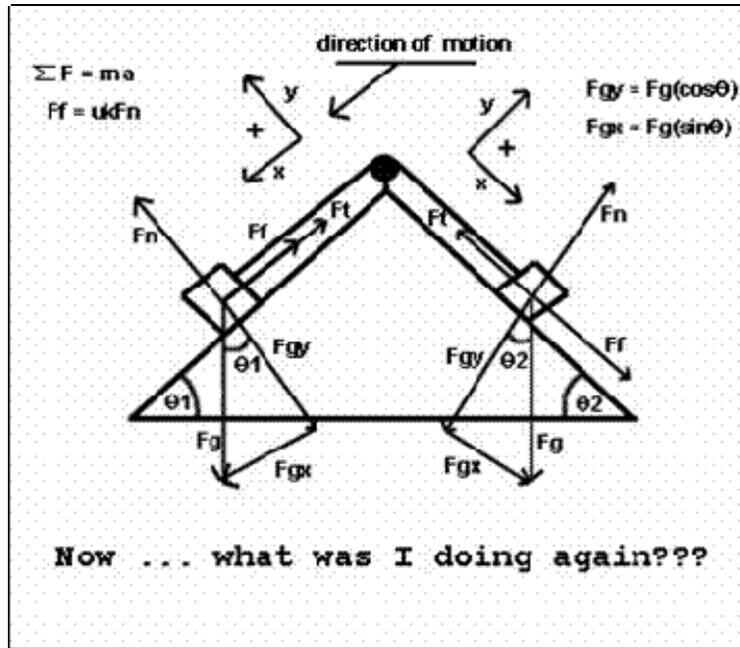
The Physics community as a whole has been shocked by these revelations and for good reason. We have always held that we were the true objective science and that outright fraud just could not happen in physics. And the past has born this out. No major case of fraud had occurred in Physics from the time of Blondlot. But now we have egg on our face and we have to admit that our arrogance was not justified. Fraud was not only possible but had occurred in two of the most famous laboratories. But keep in mind the good news of last year. **The system does work.** The fraud was uncovered by other diligent physicists who were either unable to replicate the published results or who examined closely the published data. No cover-up took place and the scientists involved were fired. The papers were retracted and steps taken to decrease the likelihood of repeat cases of fraud. But my faith in the inherent objectivity of Physics has been shaken.

—Tom

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This year's T-Shirt contest:

And the winner
of this year's T-Shirt contest is:



The artwork was designed by Greg Lenhart,
a student in the University Physics class.

The design is on the back;
"Stetson University Physics Department" is printed on the front
(in the pocket area).

The shirt color is natural (off white) and the printing is done in "Stetson green" ink.

For more information, contact Laura in the Physics office by e-mail at physics@stetson.edu or by
phone at 386-822-8910...