

CROSS SECTION

Stetson University Physics Department Annual Newsletter, Spring 1998

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Area Happenings

Hello Everyone!

Greetings from DeLand and welcome to your newsletter, Cross Section. Thanks for sending in your news. We were excited by the response in this first year for the newsletter, and we really enjoyed hearing from you.

As this is the first edition of Cross Section we want to bring all of you up to speed on the happenings in the department. First, in addition to my serving as department chair, our faculty includes Tom Lick, Kevin Riggs, and our newest member, George Glander, who arrived a year and a half ago. Look for their news in their entries for further details. Larry Ramsey has been with the department for nearly two years as our very capable machinist. And George's wife, Laura, joined the department as our secretary last June.

Professional quality research is happening in the department under the supervision of Kevin Riggs and George Glander. Kevin has had several students, including Frank McDonald and Robert Bedford, working under him during the past two summers. Both presented their research at the annual meeting of the Southeastern Section of the American Physical Society (SESAPS). George brought a lab's worth of research equipment with him when he came, and his students study low energy electron diffraction. Ryan Munden, a junior this year, presented his work with George at the November 1997 annual SESAPS conference, and he co-won the Marsh W. White award for the best student paper presentation. Another student, Gulbaz Khan '96, won the Marsh W. White award in the previous year.

The department has also been host to a number of distinguished visitors. Most recently, Dr. M.B. Webb, professor (emeritus) of physics from the University of Wisconsin - Madison, spent two days on campus. He was brought here through the American Institute of Physics Visiting Scientist Program, with the assistance of the Society of Physics Students (SPS). Dr. Webb held informal talks with our majors, and gave an outstanding public lecture entitled: "The Revolution in Surface Science – Toward Seeing and Feeling the Atoms." Our next distinguished visitor will be physics

department alum, Bill Newsome '74. Bill, a neurobiologist on the faculty at Stanford, will be on campus in March to be inducted in the honor society, Phi Beta Kappa. We are looking forward to his being back on campus.

The department is now the proud owner of a new 12" Meade fully computerized optical telescope. It is an excellent scope and very sophisticated and user friendly in operation. All we need now is a place to permanently set it up.

We now have in place a pre-engineering agreement with the University of Florida, in addition to the cooperative agreements already in place with Washington University at St. Louis and the University of Miami. It is exciting to be able to offer a wider array of opportunities to our pre-engineering students.

Since Laura's arrival in the department, we have headed full steam into actively recruiting prospective physics students. She has sent out over 400 letters to high school juniors and seniors who have expressed an interest in physics or pre-engineering. The admissions office tells me that inquiries into our program are up this year, so hopefully her efforts will pay off.

Finally, a note of thanks to all of you who responded favorably to our "featured alum" program (we hope to pursue that beginning this summer) and to those of you who offered your continued support in general to the department. Thank you!

From the entire department, we hope the upcoming year is a great one for you. Take care, and be in touch!

— *Tony Jusick, Chair*

Research Corner

In this issue we feature the research work of Dr. Kevin Riggs and his students, Frank McDonald and Robert Bedford. The research involves using holograms to reveal the vibrational pattern of several types of musical instruments. This research was started in the summer of 1996 when Frank McDonald obtained time average holograms of uniform vibrating plates (see Fig. 1) and also several types of guitar bodies. In ordinary holography, one uses the fact that interfering beams of light (one from object and one from reference mirror) can give rise to constructive and destructive interference on a piece of film. After developing the film, viewing the resulting complex interference pattern in the original light of the laser reconstructs the original wavefront coming from the object, thus producing a 3-D image. Reflection holograms are familiar to anyone that has used a credit card. However, to obtain successful holograms, relative vibrations must be kept to less than a single wavelength of the laser light used. Time average vibrational holography, however, uses the fact that an object undergoing sinusoidal motion spends most of its time at the two end points of the motion (think of a mass on a spring). The two extrema interfere giving rings or "bulls-eyes" of constructive and destructive interference. Regions of the object that are not vibrating (nodes) result in

only constructive interference, and thus appear as bright lines on the hologram. Figure 1 shows a uniform circular plate vibrating in one of its many possible modes of vibration. Note the three bright diameters and one bright circular node, indicating that this is the (3,1) mode. Note also the “bulls-eyes” in between the nodes indicating antinodes or regions where the plate is vibrating. We can even determine the amplitude of vibration by counting the number of fringes in the antinode. Figure 2 shows a hand ball from a hand bell choir set vibrating in a very similar mode as the uniform circular plate. Robert Bedford obtained this result from his work in the summer of 1997. He also looked at several types of cymbals, and also a steel drum borrowed from the music school (see the March 1996 issue of *Physics Today* for a good article on the physics of steel drums). Both Frank and Robert have presented excellent talks at Southeast regional meetings of the American Physical Society. Work on this project will continue in summer of 1998, where we hope to use a video camera instead of film to capture the images (TV holography).

— K.R.

From the Faculty

Anthony T. Jusick, chair:

I would like to say that it has been a pleasure participating in the production of our first newsletter. It's always nice to hear voices from the past and it seems that those of you who have responded to our inquiry are doing quite well in both your careers and lives. I hope that those of us who still remain here and also those who have gone on to other things have contributed in some small way to both.

I am mainly occupied, as in the past, with subjecting our new recruits to the wonders and horrors of mathematical methods in the physical sciences. I am sure that most of you remember the wonderful times we had in this course. I am pleased to say that those experiences persist to the present day. In addition I teach introductory astronomy every semester. This course continues to fascinate me although some of my students swear that it was specifically designed for physics majors. Unfortunately the entire campus now shines forth brightly every night so we are not able to do much in the way of actually looking at objects of astronomical interest. I also get my hand into an advanced physics course once in awhile, mainly introductory mechanics, thermodynamics, and occasionally quantum mechanics. I'll probably carry on to the best of my ability in the classroom for the next six or seven years and then I shall adjourn to theoretical and experimental studies of the flight of a very small white sphere.

We urge all of you to keep in touch. If you ever need our help we're only the speed of light away. A small distortion of the actual physics of the matter but hopefully understood by all.

— Tony
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Thomas A. Lick:

After being chairman for 14 years, it is nice to be in the position where someone else is responsible for the paperwork that must be processed and turned in. I can now concentrate on my teaching and continual development of the laboratories. I am sure some of you remember my early attempts to bring computers into the laboratory with my first PET microcomputer which had 32 K memory and a screen resolution of 80X140. Then came the TI-99's, the Apple IIe's, the first IBM 8086, the 286's, and now we have 486-66's in most of the labs with 12 bit A/D interfaces and all of the needed software. I no longer have to spend hours writing a new Basic program whenever we make a change in a lab. We will soon upgrade all of the lab computers to Pentiums. The challenge involved in using the early computer systems was enjoyable, but the new A/D interfaces and software are so much easier for the students to use. If you get a chance to visit DeLand, stop by in Sage Hall and see how much has changed. Of course, some things never change. I am still teaching University Physics this year as well as Advanced Mechanics and the students are being required to put forth the same effort they did when you were here.

I have now been at Stetson for 30 years and although I still enjoy teaching, I will be looking toward possible retirement in the next seven or eight years. The one experience I have not had is teaching a second generation physics major. Hopefully one of you can rectify that situation before I retire. I was pleased to hear from all the alumni that responded to our request for information. The diversity of careers represented in the responses is rewarding to all in the department and is useful in advising potential majors. Keep in touch.

— Tom
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Kevin T. Riggs:

It is certainly hard to believe that it has been over ten years since I started teaching at Stetson (Fall 1987). Time certainly flies when you are having fun. One of the factors that makes it such a joy to teach at Stetson is the quality of the physics majors that we have enjoyed over the years. Your talents were manifestly apparent during your years here, and after reading the alumni biographical sketches, I can see that you have distinguished yourselves in an astonishing variety of careers. This variety is testimony to the important principle we are always trying to convey to our current majors, the fact that the physics major is excellent preparation for a wide variety of pursuits. After all, physics, at its heart, is an exercise in problem solving, and who among us does not have problems to solve in our everyday lives and careers?

To summarize what I have been up to these past ten years in a paragraph or two is no easy job, but working on summer research with students like **Robert Ridgeway '90**, **Garrett Granroth '93**, **Rudy Held '93**, and **Amy Johnson '96**, would rank right at the top of the list. The first three students mentioned helped me get my magnetic thin films laboratory up and running (and winning a few best students paper awards along the way). Amy spend a summer working with me at Argonne National Laboratory in the Materials Science division during my recent sabbatical leave (1993-1994). We recently published a paper resulting from this work with Amy appearing as co-author in Physical Review B.

Current students **Robert Bedford '98** and **Frank McDonald '99** have helped me to start a new research program in vibrational holography (see article appearing on pg. 2). Briefly, vibrational holography uses laser holography techniques to image the modal pattern of a vibrating object (i.e. musical instruments) like a bell or a guitar body. We have some great images that I hope I can convince Robert and Frank to post on our web site in the near future (<http://www.stetson.edu/departments/physics>).

I am also working on my ambition to have taught every course in the physics curriculum. This semester, I am teaching our Optics course (with a new laboratory) as well as our relatively new course in Atomic, Nuclear and Particle physics. Other courses I have taught in the recent past include Honors Physics (Cosmology and Chaos), The Science of Music (Acoustics), Modern II (Quantum Mechanics), E&M II (Electromagnetic Theory)...(perhaps it would be easier to list the courses I have not yet taught!). Speaking of Honors Physics, I have also become very involved in the university wide honors program, since I have been serving as the Honors Council president this year. Well, I think I have run out of room for now, but I will keep you posted on my endeavors in future issues of Cross Section. Drop me an e-mail from time to time to let me know how you all are doing. I really enjoy hearing from my former students!

— Kevin
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George S. Glander:

Greetings! I don't know many of you, but I am glad to join the Stetson community. As a graduate of a small liberal arts college in Minnesota (Carleton), coming to Stetson has been like coming home in many ways - it has been good to leave the large state universities behind and return to this type of environment (I come to Stetson after 5 years of teaching at a state university in Pennsylvania). I am teaching College Physics, as well as several of the upper division courses: Modern Physics, E & M, Experimental Physics, Thermodynamics, and Senior Seminar. During the summer months, I have been busy setting up my Electron Diffraction Laboratory and doing research with students. I truly enjoy being in the lab with undergraduate students.

At home, my family and I (true northerners) are slowly acclimatizing to Florida's weather. We are enjoying all central Florida has to offer, including the beaches, the manatees, and The Mouse. I have two children, Ian - age 8 and in second grade, and Elizabeth - age 5 and in kindergarten. They miss the snow, but enjoy collecting shells from the dirt road on which we live. My wife, Laura, returned to the work force last June for the first time since Ian's birth. It is good to see her around the department.

Take care - and keep us posted on what you are up to!

— George
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The Physics Department
Faculty and Staff



Larry Ramsey, Kevin Riggs, Tom Lick, Tony Jusick, Laura and George Glander

SS SECTION was compiled and edited by Laura Glander, February, 1998