



September 2009

Physics Department Newsletter

On-Campus Edition

After 30 Years, Dennis Henry Says Goodbye

After teaching in the physics department for thirty years, **Dr. Dennis C. ("DC") Henry** has retired. Dennis received his A.B. in Physics from Wabash College in 1967, an M.S. in Physics from Purdue University in 1970, and a Ph.D. in Physics from the University of Iowa in 1978. He joined the Gustavus faculty in 1979.

At the annual Gustavus Alumni Association dinner on May 21, physics department chair and long-time colleague Steve Mellema introduced Dennis with the following remarks:

"As the current chair of the physics department, I have been given the privilege of introducing my colleague, Dennis Henry, on the eve of his retirement from our department and the College. I begin my remarks by asking you to remember four ideas: leadership, academic rigor, compassion, and dedication.

"Leadership:

It may have been a quiet week in Lake Wobegon, but for the physics department chair, it



Dr. Dennis Henry

has been anything but a quiet year. All of the work of a tenure-track hire, the writing of a strategic plan, and the conduct of our every-10-year external review have even had me dreaming about retirement. As I sat down to write these remarks, I reflected on how, for almost half of my 23 years on the Gustavus physics faculty, we were able to convince Dennis to serve as our chair. No one has done as good a job as chair as he does, and the rest

(Continued on page 4)

Jessie Petricka Joins the Physics Faculty

Please welcome our new, tenure-track assistant professor of physics, **Dr. Jessie Petricka**. Jessie was hired this past winter to replace retiring professor Dennis Henry. Jessie received his B.A. from Carleton College and his Ph. D. from Yale University, where he studied experimental atomic/molecular physics. Most recently he comes from a post-doctoral appointment at Duke University, where he worked on laser cooling/trapping research in atomic lithium. Jessie will bring his experience in building systems to the department, where he plans to construct a cold-molecule lab when his lab space opens this coming spring. As he joins our faculty this fall, he will be teaching the Experimental Modern Physics labs, Thermal



Dr. Jessie Petricka

and Statistical Physics, and Senior Seminar courses. Jessie has a wife, Jalean, and a three year old son, Leif.

Inside this issue:

STUDENT AWARDS	2
STUDENT SUMMER INTERNSHIPS	3
SPS NEWS	7
GRADUATING CLASS OF 2009	8
FACULTY ACTIVITIES	10
ALUMNI PICNIC	12

Fall Semester Dates to Remember:

- SEPT. 8 CLASSES BEGIN
- OCT. 6-7 NOBEL CONFERENCE
- OCT. 24-27 READING DAYS
- NOV. 2-5 J-TERM REGISTRATION
- NOV. 8-19 SPRING REGISTRATION
- NOV. 25-29 THANKSGIVING RECESS
- DEC. 17-21 FINAL EXAMS

Physics Department Newsletter

Annual Student Awards

As we do every year, the department is recognizing a number of returning majors with awards for the 2009-2010 academic year.



Christina Lewis ('10) has been selected as the winner of the Milward T. Rodine Memorial Physics Award. This prize is named for the longtime Gustavus professor of physics who taught here from 1933-1969, and is awarded annually on the basis of interests and scholarly achievements, to a physics major who has completed the junior year.

Brad Abell ('10) has received the Gerald and Julia Swanson Scholarship in Physics. This endowed scholarship was established to honor the work of the physics department faculty who provided Gerald Swanson with a background that prepared him for graduate study in physics and for a career with Bendix Corporation. The scholarship is intended to encourage physics students of promise who are enrolled full-time at the College.

Rachel Anderson ('10) was awarded the John Chindvall

Scholarship in Physics. This endowed scholarship was established in memory of 1970 Gustavus graduate John Chindvall by his parents and friends. It is awarded annually to a student majoring in physics.

Kyle Hulbert ('10) was selected as the winner of the Julian A. Crawford Memorial Prize in Physics. The prize is named in memory of the former chair (1967-69) of the Gustavus physics department and awarded to the student with "the greatest potential for contributing to physics and society."

Jared Ferguson ('12) received the Harold Q Fuller Memorial Award in Physics, which is given to the first-year student who has the highest overall record in physics courses. This award was established in 1997 by Professor Emeritus Richard M. Fuller (who taught at Gustavus from 1968-1999) and his wife, Judith. The award honors Richard's late father "HQ", a researcher in the Manhattan Project and physics professor and dean at the University of Missouri, Rolla, for his lifetime commitment to the teaching of young people.

Brad Abell ('10) and **C.J. Hunt ('10)** will serve as the Physics Departmental Assistants for Fall Semester 2009. These positions have a nominal expectation of four hours per week in research, course development or other activities that will assist in the work of the department.

ΣΠΣ Induction Banquet

On Thursday, April 2, five members of the graduating class of 2009 joined the national physics honor society, Sigma Pi Sigma. ΣΠΣ was founded in 1921 and is a member honor society of the Association of College Honor Societies. Nomination and election are by the faculty, based on a combination of student achievement in course work and research, and participation in department and SPS activities.

ΣΠΣ is a member of the American Institute of Physics and "exists to honor outstanding scholarship in physics; to encourage interest in physics among students at all levels; to promote an attitude of service of its members towards their fellow students, colleagues, and the public; to provide a fellowship of persons who have excelled in physics."

A banquet and induction ceremony for **Kyle Friend, Erik Johnson, Sarah Komperud, Anna Schuh** and **Christine Tupy** was held on that evening. All physics majors and faculty were invited to attend. Provost Mary Morton gave opening remarks, and the guest lecture, entitled "Focusing on the small things: pushing the limits of preclinical nuclear im-



Dr. Todd Peterson ('91), Gustavus' first Rhodes Scholar, gives his Sigma Pi Sigma Banquet Lecture

aging," was given by physics alumnus **Dr. Todd Peterson ('91)**. Dr. Peterson is an Assistant Professor in Radiology and Radiological Sciences at Vanderbilt University. He is also Gustavus' first (and so far only) Rhodes Scholar.

Physics Alumnus Wins First Decade Award

On October 4, 2008, at its annual Alumni Award Banquet, the Gustavus Alumni Association presented a “First Decade Award” to physics graduate **Dr. Jason Smerdon ('98)**. The First Decade Award recognizes early professional achievement. Criteria appropriate to selection include the difficulty of accomplishment; quality, creativity, and distinctiveness of performance; recognition by professional peers; and lasting contribution to the world of ideas and affairs.

Dr. Smerdon received his Ph.D. in Applied Physics from the University of Michigan, and is currently the Storke-Doherty Lecturer at the Lamont-Doherty Earth Observatory of Columbia University. He is also an Adjunct Assistant Professor at Columbia's School of International and Public Affairs.

During his visit to campus, Jason gave a public lecture entitled “Spaghetti Plots, Hockey Sticks, Pseudo-Realities and Congressional Oversight: A Decade of Attempts to Reconstruct the Climate of the Last Millennium.” The talk was based upon his research on statistical climate-field reconstructions and geothermal climate reconstructions. Climate

reconstructions during the late-Holocene era are important because they span the transition from the pre- to post-industrial eras and because proxies in this time period are potentially abundant enough to yield hemispheric and global reconstructions. The debate surrounding late-Holocene climate reconstructions has played out on many public stages, including the popular news media and the United States Congress. Reducing uncertainties in the reconstructions is an important goal for the public as well as the scientific communities.



Dr. Jason Smerdon ('98) receives his award plaque at the 2008 Alumni Award Banquet

Students Spend Summer Time in Internships

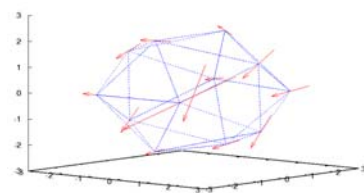
As is true each year, our student majors were involved in a variety of internship opportunities during the summer of 2009.

Brad Abell ('10) writes, “This summer I worked at the University of Minnesota, Twin Cities, with professor J. Woods Halley on computer simulations of Platinum clusters. My REU was through the Minnesota Supercomputing Institute (MSI) and was a 10-week internship.

“I began the summer by learning to use UNIX, a command line operating system, reading quantum mechanics and quantum theory, and learning to write Fortran 90 code. The codes I used looked at 13 atom platinum clusters which are useful in the development of fuel cells.

“Hydrogen fuel cells use platinum as a catalyst to help create energy for use as an alternative energy source to fossil fuels. The reaction of interest in this process is the oxygen reduction reaction that occurs at the cathode. Platinum is a good catalyst for use in this chemical reaction but it could be improved. Platinum in bulk is not magnetic, but in small clusters (Pt_{13}) orders magnetically. Other alloys of platinum, such as Pt_3Fe and Pt_3Co are better at catalyzing the oxygen-reduction reaction and are magnetic. This project ex-

plored the possibility that there is a correlation between these magnetic properties and catalytic behavior. Such correlations have been known to exist experimentally for over 70 years, though the detailed mechanisms are not well understood. To test this, a self-consistent tight binding code (SCTB), created previously by this research group, was used. This summer the code was used to search for non-zero-spin, low-energy states of the 13 atom platinum clusters.



“To search for states with non-trivial magnetic properties this SCTB code was altered to create a magnetic field at the atomic sites to induce spin. After solutions for the electronic structure were found with the fields applied, they were suddenly removed and the electronic state was recalculated to try and find energy minima with finite magnetization. Three different magnetic fields were used: collinear, random, and vortex-like. A first-principles calculation using VASP, another computer approximation method, was also done on the same clusters for comparison. VASP was used to try and

(Continued on page 6)

Physics Department Newsletter

Dennis Henry Retirement Introduction

(Continued from page 1)

of us in the department have always agreed that there's no one we'd rather have representing our interests with the administration than Dennis. I have never met a leader who is better at dealing with details. With Dennis as Chair, we could always rest assured that no "i" would go undotted, no "t" uncrossed. Every significant interaction with any external constituency would be documented, in writing, with dates and signatures. He was famous for prompting reluctant Deans by drafting "memoranda of understanding" to which they could respond (or not). But at least, one way or the other, we would have, in writing, the outcome of any negotiation.

"Academic Rigor and Compassion:

When our external evaluators visited the department this spring, I met them at the airport and their first question was, "How do you folks graduate so many physics majors?" I responded with my usual casual remarks about what great students Mark Anderson and the Admissions staff bring us, and how all we have to do is show up to teach every day which,

given the quality of our students, is a lot of fun to do. But on taking the time to actually reflect, I realize what it is that makes our program and other academic programs at this College so great. It is a remarkable combination of academic rigor with compassionate mentoring.

"When the history of our department is written (and if it ever is, I would bet that Dennis is the best person to write it), it will be clear that there are two "founding fathers" of our physics program. They are Richard Fuller and Dennis Henry. Dick was my advisor, 37 years ago, when I graduated as a physics major, and was my colleague on the faculty for 13 years before he retired ten years ago this week. When Chuck Niederriter and I joined the department 23 years ago, it was Dick

and Dennis who hired us. And they were, to my way of thinking, an example of Dick's favorite topic in physics - the principle of complementarity. All of us, as professors, need to have some of each of these two qualities - compassion and academic rigor. And we were very intentionally mentored by our two senior colleagues in both of these areas. While they are both shining examples of each of these qualities, to me Dick will always be the one who emphasized the importance of compassion - knowing our students as people, educating them holistically. And Dennis will always, to me, be the one who taught us

that compassion and sympathetic mentoring did not mean the abandonment of academic rigor. On the contrary, the hallmark of a Gustavus education is precisely this - that one obtains a rigorous education in the finest tradition of the liberal arts from professors who are passionate about what they do and compassionate with their students.

"Dedication:

There is one more profound thing that I have learned from Dennis, and that is that you don't build a quality academic program without dedication to your job, your department and this College. It's never been a 9-to-5 job, and certainly not as department chair. And Dennis' example, coming early and staying late, serving on committees and doing the jobs that need to be done, and then coming back again in the evening to be there when your students are presenting their research talks, is another reason why we have the kind of academic program that we do at this College.

"About 15 years ago when the idea of having 'mission statements' became the new fad in education, we all raised our eyebrows a little, but went ahead and authored one, as commanded from on high. As our Department Chair at the time, Dennis is really the main author of our department's statement. I would like to read you two lines from it, which are definitely Dennis' words, and that say a lot about who we are and who he is.

'We believe that an education in the Liberal Arts, in which we include the sciences not append them, is the best preparation for a life of intellectual growth and service. We believe in the importance of our discipline, and that communicating and extending it are worthwhile and compatible life goals.'

"For thirty years, Dennis Henry, like his father and grandfather before him, has made it his life's service to communicate and extend his discipline to a generation of students. Gustavus students have known "DC", as they call him, as professor and mentor. They have heard his lectures and taken his notoriously challenging exams. They have visited his office countless times for help and advice. They have played with the model railroads in his basement and the old pinball machine in his home office. They have learned - about leadership, about academic rigor, about compassion and about dedication.

"As he and Mary embark upon their new adventures in retirement, we wish them well. And we know we'll still see Dennis in the coming years, if only to have dinner with us at Whiskey River and drink a pitcher of 1919 root beer.

(Continued on page 5)

Dennis Henry's Retirement Remarks

(Continued from page 4)

"Ron, it is my pleasure to present, thank and congratulate Dennis Henry for 30 years of service and his retirement from Gustavus Adolphus College."

Following the introduction, Dennis gave the following remarks to the audience:

"Thank you, Steve.

"Many deans ago, Dick Fuller recruited me to fill the position being vacated after only two years by Michael Sharrock, who had decided to take a research position at 3M, at more than double his Gustavus salary. My interviews that sunny but cold March morning started in Carlson Administration Building, and on the steps we bumped into Dean Robert Karsten, whose first words to me were 'You must be the physics candidate. I like your hairline. You're hired.' Those of you who knew Bob Karsten will recall that he was very competitive in the low hairline department. I'm confident that the provost and deans have adopted other ways of welcoming and evaluating prospective faculty.

"Fortunately, Dick had arranged for me to be interviewed by people whose friendship and wise counsel I value to this day. They include Tom Gover, Claude Brew, Dick Martin, David Fienen, Julie Johnson, and Paul Tillquist. They answered many of my questions, particularly about the state of shared faculty governance at the College, and they helped me decide that Gustavus and I might have a future together. Those are obviously crucial questions, to which prospective faculty need honest answers.

"The College was just coming out of a two-year salary freeze that concluded a very difficult decade, financially and otherwise. The physics department had three tenured faculty, two of whom really wanted to be doing something else somewhere else. The Class of '79 numbered four physics majors, with not very more than that in the pipeline. The department was crammed into the north end of the Nobel Hall basement, and the biology chairman had his own plans for some of those laboratories. I found rooms full of equipment, much of it industry surplus and a lot of it neither relevant nor functioning. Dean Karsten paid me a small overload stipend to repair enough equipment to teach the listed lab courses, but real improvement had to await new equipment, and our good fortune of hiring Warren Bidwell in 1982. Warren had his own repair shop in Le Sueur and worked for us as electronics technician for the sciences, first for one day a week, then two, then three, until he became a full-time employee in the late 1980's. Our program is still highly dependent on him, even though he unfortunately no longer reports to the sciences.

"By 1983 Omer Prewett and Wendell Bradley had taken leaves to explore other opportunities and when they resigned in 1985 we hired, in sequential searches, two best friends with new Ph.D.s from Ohio University, namely Chuck Niederriter and Steve Mellema. By this time, with the help of visiting alumni faculty John Bolcom and Jerry Crawford, we were averaging eight majors per class and the climate for student success had improved dramatically. Tom Huber joined us as the fifth member of the department in 1989, the year when the Olin Foundation selected Gustavus to receive 5.1 million dollars for the fine building we have occupied since 1991.

"When Dick Fuller was named as the first Hansen-Peterson Professor of Liberal Studies in 1993, we were fortunate to attract Paul Saulnier to Gustavus. A string of very strong graduating classes, including the College's first, and so far only, Rhodes Scholar, Todd Peterson, were by then averaging a dozen physics majors. The number who went on to complete the doctorate in physics and related fields was drawing favorable national rankings, and our already strong and productive working relationship with the Admissions staff was essential to all of this. Our program has also benefitted these past four years from the many talents of our lab manager, instructor and computer support person Jim Miller.

"My goals when I graduated from Wabash were to earn the doctorate and teach physics at a strong Midwestern liberal arts college, preferably in Minnesota. I knew something of what this would entail, having grown up in that environment. I knew that it would offer the opportunity to teach a wide range of courses and work with good students and colleagues, while juggling limited resources. It seemed very likely that I could walk to work, as I have for the past thirty years, and to enjoy the benefits of sharing a home with Mary in pleasant surroundings. I hoped to develop interdisciplinary research in applied physics, but I could not have predicted the symbiotic outcomes that January-Term courses, summer consulting in industry, and participation in then unfamiliar professional organizations would have on my research and practice in railroad history and technology, in electromagnetic compatibility, and other specialties. I hope to stay active in these areas and pursue postponed and new projects.

"I KNEW THAT IT WOULD OFFER THE OPPORTUNITY TO TEACH A WIDE RANGE OF COURSES AND WORK WITH GOOD STUDENTS AND COLLEAGUES, WHILE JUGGLING LIMITED RESOURCES."

(Continued on page 6)

Physics Department Newsletter

Dennis Henry Retires

(Continued from page 5)

I AM
GRATEFUL
THAT I HAVE
HAD A CAREER
DOING WHAT I
LIKE MOST,
NAMELY
EXPLAINING
AND
EXPLORING
PHYSICS.”

“This will be the first time since 1922 when neither my grandfather, father, nor I will be teaching either English or physics at the college level. However, nieces and nephews are in their apprenticeships now, and I see the likelihood that this family tradition in academia will continue. I am grateful that I have had a career doing what I like most, namely explaining and exploring physics. Thank you.”

The department and the College will miss the many contributions that Dennis Henry has brought to us for

30 years. His legacy of teaching, mentoring and service will continue to inspire us all, and his qualities of leadership, academic rigor, compassion, and dedication will continue to be emulated by future generations of Gustavus faculty members.

At the 2009 Gustavus Commencement ceremonies, Dennis Henry stands to be recognized by the audience on his retirement after 30 years of teaching.



Summer Internships

(Continued from page 3)

replicate the results of a previous study on Pt₁₃. Two different geometries previously found to be stable, Cuboctahedron and Icosahedron, were used in these simulations. We successfully found one stable geometry, a slightly altered icosahedron (see picture on page 3), which gave a non-zero spin state of 0.447.”

Rachel Anderson ('10) writes, “I spent 2½ weeks in Carlisle, Pennsylvania working at Dickinson College with The John's Hopkins University's Center For Talented Youth, or CTY. I worked as a teaching assistant in a Fast-Paced High School Physics course taught by Brian Hastings, a career



Rachel and friends at the Center for Talented Youth

High School Physics teacher who teaches near York, PA. Our plan was to cover an entire book of conceptual physics (over a year's worth) in three weeks! Our students were at the top of their classes, and many found the pace of the class to be very demanding. I

was responsible for gathering the 11 students to and from the seven hours of classroom time, including instructional classes, labs and study sessions. These were all located in Dickinson's Rector Complex Center, which houses its Physics, Chemistry and Biology departments. I also helped with correcting student work and tests, helping to facilitate labs, running and tutoring during the study session several nights a week, teaching a few concepts, and other general clerical tasks. Unfortunately, during the second week out of three, a significant amount of students participating in CTY were exhibiting flu-like symptoms--so many that CTY was forced to end a week early, and students and faculty were sent home. Though I was disappointed to miss the last week and all its experiences, I enjoyed my time there and learned a great deal more about how to teach physics!”

Bryce Bjork ('11), C.J. Hunt ('10) and Dan Mellema ('11) all worked at Gustavus this summer using the scanning vibrometer system in Professor Tom Huber's acoustics lab. Bryce writes, “Our main task this summer dealt with the validation of a previous method of selective excitation of coupled microcantilevers via ultrasound. Through this method, the symmetric and antisymmetric modes of a coupled microcantilever can be selectively excited through a simple phase shift between two ultrasound transducers. The first portion of this task was to integrate new hardware into our lab setup and to write the software to control it. This new hard-

(Continued on page 7)

Gustavus SPS Chapter Receives National Recognition

For the third time in the past four years, the Gustavus chapter of the Society of Physics Students was named by the national SPS office as an “Outstanding SPS Chapter” for 2007-2008. The award letter cites “the depth and breadth of SPS activities conducted by your chapter in such areas as physics research, public science outreach, physics tutoring programs, hosting and representation at physics meetings, and providing social interaction for chapter members.”

Activities in 2008-2009 included regular meetings with presentations by members about their summer research internships as well as outside speakers. Outreach activities included demo sessions during Nobel Conference, hosting two sessions (on Physics and Astronomy) for an elementary-student Science and Nature camp; hosting all the sixth grade classes from North Intermediate School in St. Peter for an afternoon of “phun physics”, and participation in the Science on Saturday program for school-aged children in the area.

The first SPS meeting will occur early in the fall semester, at which time the officers will outline their plans for fall activities. At the first meeting, the faculty members will also make

brief presentations about opportunities for student collaborations in research projects.

The newly-elected SPS officers for 2009-2010 are:

Co-Presidents: **Brad Abell ('10)** and **Joel Howard ('10)**

Secretary: **C.J. Hunt ('10)**

Treasurer: **Erik Huemiller ('11)**

Activities Coordinator: **Christina Lewis ('10)**

Sophomore Representative: **Joe Carlson ('12)**

The SPS club at Gustavus forms a hub for both academic and social activities within the physics department. All students are encouraged to participate.

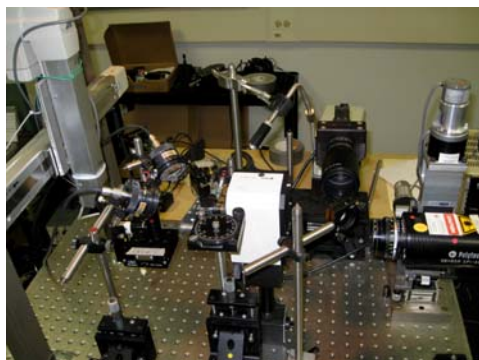


Sam Schwartz ('09) shows a young student the “jumping rings” demonstration during the “Science on Saturday” activities.

Student Summer Work

(Continued from page 6)

ware consisted of an Ultrafast signal generation card to produce the ultrasound signal, as well as linear actuators to control the position of the ultrasound transducers. After we received our high-frequency, focused BAT ultrasound transducers, we were



The Scanning Vibrometer System

able to begin acquisition and analysis of data pertaining to the main focus of the project, selective excitation. During the course of the project, we had a few setbacks, the largest one being the loss of one of our transducers due to an aberration on its microfilm surface. However, throughout these setbacks, we were able to find solutions that allowed us to continue our project. In this respect, the atmosphere of the Gustavus summer research

program was very helpful, always encouraging interaction and advice across the different scientific fields present on campus. Although our results thus far have been less than optimal, we are confident that with some creative and innovative thinking, we will be able to clear the roadblocks in our path.”

Joel Howard ('10) says, “My summer has been going very well. At PaR Systems this summer I am technically a software engineering intern. My projects have included creating a system to easily convert I/O points from AutoCAD Electrical into a format used by the robot controllers as well as writing Access and Excel VBA macros for various other projects. Currently (actually for the past 6 weeks) I've been doing research and analysis of the dynamics and statics of a Cable Suspended Robot that has 6 degrees of freedom at the end effector (similar to the NIST Robocrane, but on a much larger scale). I've learned a lot about finite element analysis methods and finally have a task that lets me use much of what I've been taught at GAC; so overall it's been great!”

Kyle Hulbert ('10) worked part-time this summer with Jim Dontje, the Director of Gustavus' Johnson Center for Environ-

(Continued on page 9)

Physics Department Newsletter

Graduating Class of 2009

Twelve physics majors graduated from Gustavus at the commencement ceremonies on May 31, 2009. Some of them have agreed to share their future plans and also provide some “words of wisdom” for future physics graduates.



Kyle Friend writes, “This fall I will be attending the University of Minnesota to study mechanical engineering. I plan on working towards an M.S. degree and then hope to get a job in industry after that. For advice, I'd say to enjoy your time at GAC, because it will be done before you know it.”

Matt Jester says, “This summer I have been working for the St. Louis County Bridge Department doing surveying, which has rewarded me with an intimate knowledge of northern Minnesota's numerous swamps. In the fall, I will be attending the U of M for a dual-degree electrical engineering program. As for words of advice, I'd say work hard and don't give up.”

Brett Johnson writes: “I'm going to the U of M this fall, doing the dual-degree program in civil engineering. I don't have a whole lot of advice, just to not slack off, keep on top of things, and watch out for that jump from Classical II to Classical III; it's a big one.”

Erik Johnson says, “I'll be starting classes at the University of Minnesota in a couple of weeks. I'll be going there for a

couple years, and I'll end up with a bachelor's degree in mechanical engineering. The dual degree program allowed me to do this rather than go straight to an engineering masters program. I would tell the younger physics majors to get to know your professors. They're great people, and great sources of help if you get stuck on a problem.”

Sarah Komperud is pursuing graduate studies in physics at Rutgers University in her home state of New Jersey. She writes, “I'm officially enrolled at Rutgers. Classes start Tuesday (Sept. 1) with high energy astrophysics. And for words of wisdom for everybody: The major is difficult; anyone can tell you that, and at times you will absolutely hate it. But if you find your niche, that good group of friends and new jokes for Chuck to show at the beginning of each class, you'll survive and it will be worth it. For the seniors: When studying for the GRE study wisely, more than you think you actually need to and be confident in what you know. After that, raise a glass, make a toast, and remember to go to class come spring semester.”

Matthew Pennington says, “I've spent the past few months since leaving Gustavus working for Abbott Pharmaceuticals and living at home. In early August, I'm leaving for Montreal on a six-month work visa through the BUNAC program, and I'm applying for jobs like mad. In the longer term, I'm looking at graduate programs in transportation engineering, with the career goal of working in urban mass transit in Chicago. I can't say I've missed the wind on the Hill much, but I

(Continued on page 9)



2009 Class Photo: **Faculty:** Chuck Niederriter, Steve Mellema, Tom Huber, Paul Saulnier, Dennis Henry, Rajan Murgan, Jim Miller
Students: Christy Tupy, Sarah Komperud, Anna Schuh, Peter Stauduhar, Matt Jester, Brett Johnson, Erik Johnson, Kyle Friend, Billy Cuevas, Jens Hagstrom, Matthew Pennington (Not pictured: Sam Schwartz)

Graduates' Future Plans

(Continued from page 8)

definitely miss the physics department. It's not going to be the same without DC, but I'm sure the department will continue to be excellent."

Anna Schuh says, "This fall I will be starting graduate studies in Industrial Engineering at Virginia Tech. As much fun as I had in the GAC physics department, I am looking forward to starting something new. I'm not sure what to expect just yet, but I'm sure it will be better than anything I could ever plan. My advice is for life in general: be good to people. The karma will take care of itself."

Christy Tupy writes, "My future plans as of right now are to attend the University of Minnesota for Industrial Engineering. I chose the U because the IE department is very small just like our physics department at Gustavus (only about 40

graduate students). I am in the Master's program, but I plan to go on to get my Ph.D., which my advisor explained to me I can switch to at any time I want. I will always be grateful for all of my physics professors. All of you have made an impact on my life, and I can't thank you enough. Words of Wisdom: Start applications for grad school early! And...just enjoy all the moments you have left at GAC!"

"WORDS OF WISDOM: START APPLICATIONS FOR GRAD SCHOOL EARLY! AND...JUST ENJOY ALL THE MOMENTS YOU HAVE LEFT AT GAC"

Student Summer Internships

(Continued from page 7)

mental Innovation. Kyle says, "This summer I am working for the Region Nine Renewable Energy Task Force in Mankato Minnesota. The task force is working to promote renewable energy projects in the southern part of Minnesota. Some of the things we have been doing include educating residents in the area about the benefits of wind energy, helping counties create responsible and reasonable wind ordinances, and assisting communities with setting up their own wind projects. One of the things I have been working closely on is the construction of four weather towers that can be used by communities interested in assessing the viability of wind turbines in their area. I've had a lot of fun working with Region Nine and the internship has been valuable in teaching me about some of the challenges wind energy faces in smaller communities and how they can be overcome!"

Along with Gustavus Visiting Assistant Professor of Physics Dr. Todd Zimmerman, **Mark Koten ('10)** spent the summer at the University of Nebraska in the Research Experience for Faculty and Students at Undergraduate Institutions. Mark writes, "The research program that I was involved in turned out to be a fantastic opportunity for me to gain some insight into the scientific community, particularly concerning graduate school. The program was immensely helpful in providing information on how to apply and what to expect. My research was very fun and interesting too. I also had plenty of help along the way from grad students and my mentor at the University of Nebraska Lincoln. It was a large program

(56 undergrads total spanning many fields) and we were all fortunate for the opportunity to meet and get to know each other. The purpose of my project was for me to structurally and magnetically characterize an alloy made from pure gadolinium and boron. This alloy was made by first melting these two elements together to form an ingot that would then be rapidly solidified into metallic ribbons for testing. Four samples were produced for the purpose of describing a eutectic point, or minimum melting point between the two phases of Gd and B. This was the region that Dr. Shield, my mentor, was most interested in. Magnetic testing was primarily performed with the use of the SQUID (Superconducting Quantum Interference Device) and the structural testing was done with use of an X-Ray Diffractometer and a Differential Thermal Analyzer. The alloy proved to be a two-phase system made up primarily of gadolinium crystals but also containing an amorphous phase with grain sizes on the order of 50 nm. The samples near the eutectic region proved to be a soft magnet, which was only ferromagnetic at low temperatures such as at 10 K."

Any student interested in pursuing an internship for summer 2010 should meet as early as possible this fall with his or her academic advisor to begin planning. Internship applications are typically due in January, but the current economic situation and reduced government funding have limited the number of available positions and made the application process more competitive than it has been for a number of years.

Physics Department Newsletter

Summer Activities for the Physics Faculty

As they look forward to the fall of 2009, the physics faculty members spent the summer both working and playing.

Tom Huber had a busy, but short summer. He had a very productive summer working with **C.J. Hunt ('10)**, **Bryce Bjork ('11)** and part of the summer with **Dan Mellema ('11)** on his NSF funded research project. (See the story on page 7.) The group made significant progress, and will spend time this fall writing up their results for publication. Tom once again spent a week at Purdue University in Lafayette, Indiana, where he has been working with a group studying vibration of micro- and nanocantilevers. Tom also participated in the Purdue Guitar Workshop where he gave talks on how electromagnetic pickups work and the physics of guitars. While there he used some of their facilities and the expertise of the luthiers who were helping teach the workshop to start working on constructing an acoustic guitar. Since one of his research interests is in musical acoustics, he is learning a great deal about the construction of guitars by continuing to build this one. In the last half of the summer, a major focus of his time was on preparing two NSF proposals. The first is a \$375,000 proposal to obtain a state-of-the-art scanning laser Doppler vibrometer system; this would allow for an incredible enhancement of his ultrasound research, as well as for studies of musical instruments. The other is a \$341,000 collaborative proposal with the other members of the department as co-Principal Investigators. The goal of this proposal is construction of an ultra-low background acoustics lab, modifications of the current acoustics lab to accommodate Jessie Petricka's research program, and an upgrade to all of the other basement labs. These proposals came about because of one-time opportunities for stimulus funds that were allocated to the NSF. If the proposals are funded, starting next summer, Gustavus students will be working with some of the best equipment in the world in a lab optimized for sensitive acoustics research.

This fall, Tom will be teaching Experimental Modern Physics and a First Term Seminar on energy. He continues as the department's coordinator of summer internships, and will be the faculty advisor for pre-engineering. He will also serve on the International and Domestic Programs Committee.

It was a restful summer for **Steve Mellema**, who began preparations for his 2009-2010 sabbatical leave. The most visible manifestation of the summer is a new roof on the Mellemas' house, which is also receiving a new coat of paint. Much of the summer time was spent hosting visitors and following the season of the St. Peter Boys' 16-and-Under soccer team, on which younger son Jake and his teammates

made it all the way into a one-game playoff to gain entry into the annual state tournament, only to lose out on a last-minute goal. During his leave this coming year, Steve will be working on two writing projects: a prospectus for a new introductory physics textbook and a compilation of the lectures and activities that he and Professor Sylvester James Gates, Jr. used two years ago in their course entitled "Superstring/M Theory: The DNA of Reality?"

Jim Miller writes, "In July my family and I were out in Ann Arbor for the AAPT meeting at the University of Michigan, my old grad school. It was fun to reminisce and walk the halls and sidewalks. The campus has certainly changed! I ran into one of our recent majors, **Michelle Price ('08)**, in a stairwell of what used to be one of my mechanical engineering buildings. Sounds like she's doing well and likes it there. AAPT is always good for the soul with the many inspiring talks and stories the participants bring. Among my favorites this year were presentations on how students are being better enabled to think about and understand physical systems using the power of computational tools.

"Earlier in the summer, we had another run-in with the long arm of the Gustavus physics department, only 35 miles southeast of Saint Peter, in Madelia. My dad grew up there and his grandmother was part of the Dodge family. **Jim Wade ('86)** is also a descendant of this family as I found out, by chance, talking to his mother at the Dodge family reunion in Madelia. Jim Wade's physics degree has led him down a fascinating career path including work at MIT and NASA (<http://www.ll.mit.edu/about/Organization/wade.html>).

"I've been consulting for my previous employer, Pacific Northwest National Lab. This has involved planning a new round of feature improvements for my web-based simulation (energy and economic analysis) of a roof-top air conditioner (<http://www.pnl.gov/uac/costestimator/main.stm>).

"I'm looking forward to trying out a couple of new labs I developed this summer for the General Physics lab series. These labs have a significant shift in style and content and try to be less prescriptive and more exploratory with active problem-solving exercises for the students."

Rajan Murgan writes: "As most of my previous recent summers, summer 2009 has been, research wise, relatively productive and fun. The first half of my summer was spent entirely on a research problem that I started in the spring of 2009. Specifically, I worked on a mathematical formalism

(Continued on page 11)

Faculty Summer Activities

(Continued from page 10)

that is related to the quantum deformed Hubbard model. This also generalizes a previous work on integrability in string-gauge duality, in particular in the so-called open string/spin chain sector of AdS/CFT. The work was then subsequently published in the 2009 September issue of *Fortschritte der Physik*. The rest of the summer was spent mostly on other research problems in integrable models. In particular, I studied (and am still studying) finite-size effects in spin chains and sine-Gordon (and supersymmetric sine-Gordon) models using a method known as the NLIE (Nonlinear Integral Equation) technique. It is my hope that all these works will serve as a crucial preparation and a warm-up exercise for a tougher task ahead. In addition to teaching activities, these problems will define the most part of my (research) activities for the coming academic year at Gustavus." Rajan will be teaching Classical Physics III and Quantum Mechanics this fall.

The summer was full of work for **Chuck Niederriter**, from wind turbines to the Nobel Conference. We are well prepared for this fall with "H₂O: Uncertain Resource", with great speakers, including for the first time a Nobel Literature Prize Winner, Derek Walcott. We also have a full slate of speakers for the 2010 Conference, "What Makes Food Good", and the poster should be ready to hand out at this year's event.

In late July, Chuck attended the AAPT meeting in Ann Arbor, Michigan, to catch up on the latest developments in physics and astronomy education. Of course, he also had an opportunity to catch up with old friends at the conference, including a number of former Gusties. It was great to see the labs and hear about the work of alumni like **Michelle Price ('08)**, **Kelly Younge ('05)**, and **Kirsten Tollefson ('92)**. As always, he came home with more ideas for labs and demonstrations.

The rest of the summer was filled with weekend camping trips, a week-long work trip to Pennsylvania, home projects, working on cars, and working on Habitat for Humanity pro-

Tom Huber Promoted to Professor

After completing a year-long promotion process, **Dr. Tom Huber** was promoted to the rank of "Professor" by action of the Gustavus Board of Trustees at their June meeting.

As prescribed in the Gustavus Faculty Manual, this promotion is based upon "continuing excellence and growth as a teacher; an established record of professional accomplish-

ments. Chuck finally got the electric car finished so he can drive it to campus when it is too wet or cold to bike. This will be a busy year for Chuck, continuing as the Director of the Nobel Conference, teaching Astronomy again, as well as Natural World. On top of those fun jobs, he also continues to serve on the Petitions Committee, Benefits Committee and returns to the Compensation and Budget Committees.

The summer of 2009 was filled with preparation for the new and old responsibilities that **Paul Saulnier** will be charged with during this coming academic year. Paul will serve his first year as the physics department chair (assuming the rest of the department does not impeach him) and his first year as the Kendall Center faculty associate for new faculty programming. As department chair, Paul will try to keep the administrative gears turning and will also try to approach the high standard set by his predecessors. As a Kendall Center associate Paul will be responsible for the new faculty mentoring program and all orientation and training sessions. Additionally, Paul will also be serving as an at-large member of the Faculty Senate as well as coordinating the Faculty Shop Talk series. Finally, the Saulnier family also managed to get away for one week in between summer and fall soccer seasons. In addition to his other duties, this fall Paul will teach Classical Physics I.

Todd Zimmerman writes, "I spent this summer, along with **Mark Koten ('10)**, at the University of Nebraska - Lincoln studying the magnetic properties of various materials. My work focused on modeling the micromagnetic behavior of thin films of SmCo₅ as well as FePt nanoclusters to see how the magnetic hysteresis curves change as the structural shapes of the materials change. Due to the intense computational requirements, most previous modeling has focused on simplified shapes, but using the supercomputing facilities at UNL, I was able to model the actual geometries.

"I am excited to teach Mechanics and General Physics I again this fall and look forward to working with students on my research."

ments; and an established record of leadership in the governance of the College, the department, in the faculty and its committees."

Congratulations, Tom!



Dr. Tom Huber

Editor's Note: This Newsletter is issued at the beginning of the fall semester for the benefit of current and prospective students, alumni, faculty and others interested in the physics program.

Students enrolled in the major course sequence will also be receiving copies of the current physics curriculum and advising guide and a users' guide to the physics software on the department's computer network.

All students are reminded to make an appointment to visit with their faculty advisor early in the fall semester, to discuss study abroad, January and Spring registration, or any other items of mutual interest.

Cover Photo: See below

Second Annual Physics Alumni Picnic

On Sunday, July 19 the department held its second annual picnic for physics alumni and their families. Those attending included Oren Quist ('65), Steve Mellema ('72 and faculty), Scott Blomberg ('90), Ben Leadholm ('90), Debbie ((Lightly) Mascaro ('95), Karl Erickson ('96), David Anderson ('01), Danielle Berg ('08), Eva Cornell ('08), Jing-Han Soh ('08), and Anna Lindquist ('08). Other faculty members in attendance were Dennis Henry, Tom Huber, Jim Miller, Chuck Niederriter and Paul Saulnier.



Cover Photo: "Where Sand Meets Sea"

by Kelsey Rose Weber from Wildwood School, Los Angeles, California

First Place Winner ("Contrived" category) in the 2009 AAPT High School Physics Photo Contest

This photo was contrived by placing a transparent sphere against the beach horizon. By matching the refraction from the sphere with the point where the shoreline and skyline meet, this photo demonstrates the physics of refraction. By means of refraction, lenses form an image. The glass sphere in this photo acted as a lens, causing the inverted image. This photo was taken at the Venice beach in Los Angeles, California and shows the beauty of combining physics with one's own natural surroundings.