

Gustavus Physics

Radiations from Olin Hall

This annual newsletter captures highlights of the 2001-2002 academic year, and news from current students, recent graduates and faculty.



Enrollments in our courses continue very strong, and the U.S. annual number of physics B.A./B.S. graduates is again rising, with a good slope. Our graduates from the Class of 2002 are pursuing their further educations and careers in a variety of ways. First-year and returning students will find some new equipment and computers in Olin Hall, and many opportunities for fun with physics.

Faculty Comings and Goings

Dennis Henry succeeded **Steve Mellema** as department chair on June 2, and began a new three-year term in that familiar position. He plans more research projects with students in the area of electromagnetic interference.

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Students Receive Departmental Awards

At the end of the 2001-2002 academic year, the physics department recognized several of our rising senior majors with awards for the 2002-2003 academic year.

Erik Brekke and **Eric Nordberg** have been selected as the winners of the Milward T. Rodine Memorial Physics Award. This cash prize is named for the

longtime Gustavus professor of physics (who taught here from 1933-1969) and is awarded annually to a junior physics major on the basis of interests and scholarly achievements.

Troy Anderson and **Sean Hosein** received the Gerald and Julia Swanson Scholarship in Physics. This scholar-

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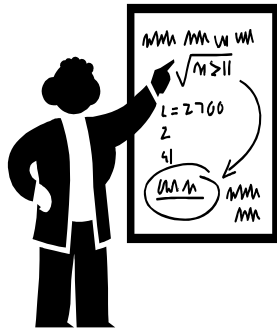
Fall Semester 2002

Dates to Remember

- Sep. 4 Classes begin
- Oct. 1-2 Nobel Conference
- Oct. 18-21 Fall Break
- Nov. 4-19 January Term and Spring Registration
- Nov. 28-Dec. 1 Thanksgiving Break
- Dec. 16-19 Final Exams



Faculty Comings and Goings



Faculty members juggle some new assignments outside the classroom this year.

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Tom Huber has retained his mix of duties, in advance of his sabbatical leave coming in the 2003-2004 academic year. He continues as advisor for pre-engineering and dual-degree programs, coordinator for summer internships, webmaster for the physics department, and he represents us in library, teacher education, and curriculum matters. He will also be pursuing his acoustic research, as outlined in the “Faculty comings and goings section.”

Steve Mellema will be on a sabbatical leave for the 2002-2003 academic year. From October 15 through April 15 he will be a Fulbright Fellow attached to the School of Physics at *Universiti Sains Malaysia* (the Science University of Malaysia) in Penang. During his time he will lecture, collaborate on research projects, and give presentations and workshops on the creation of web-based materials for teaching physics.

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Annual Student Awards

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ship 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 the Bendix Corporation. The scholarship is to encourage physics students of promise who are enrolled full-time at the College.

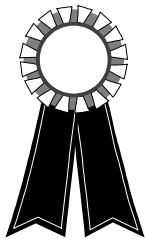
Jeremiah Jazdzewski was awarded the John Chindvall Scholarship in Physics. This endowed scholarship was established in memory of 1970 Gustavus graduate John Chindvall by his parents and friends. It is awarded annually to a student majoring in physics.

Brian Collins was selected to receive the Julian A. Crawford Memorial Prize in Physics. This prize consists of a one-year membership in the American Association of Physics Teachers (AAPT). The prize is named in memory of the former chair of the Gustavus physics

department (1967-69) and awarded to the student with “the greatest potential for contributing to physics and society”.

In consultation with the Physics Department, the Department of Mathematics/Computer Science has chosen **Chat Custer** and **Erik Brekke** as the winners of the 2002-2003 John Borneman Prize Par Excellence in Mathematics. This award is named in memory of John Borneman, a 1955 Gustavus graduate, by his family. It is presented annually to an outstanding student in the fields of mathematics and physics.

In addition, **Jeremiah Jazdzewski** and **Eric Nordberg** have also been named Physics Departmental Assistants for Fall Semester, 2002. This position has a nominal expectation of four hours per week in research, course development or other activities that will assist in the work of the department.



Students majoring in physics are eligible for a number of awards.



More Faculty Comings and Goings

Chuck Niederriter continues to shoulder the burden of physics network computer manager for another year, but with the collective understanding that this responsibility reside in a support specialist position in future years. He will again be the faculty advisor for the Gustavus SPS (Society of Physics Students) chapter. He has accepted the campus position of co-director of General Education.

Paul Saulnier returns from his on-campus sabbatical and takes back responsibility for the department's program of outside speakers. Paul will also be the coordinator of the Faculty Shop Talk series as well as serving on the Faculty Development committee. He will be engaged in student-faculty research projects throughout the year. These include optical scattering experiments as well as simulations and experiments dealing with swarming or

clustering behavior in nature.

Todd Coleman joins the physics faculty as Visiting Assistant Professor, replacing Steve Mellema. Todd has just completed his Ph.D. in theoretical elementary particle physics at the University of Wisconsin-Madison, where he became acquainted with Gustie physics graduates **Jay Anderson ('95)**, **Karl Vigen ('95)**, and **Nate Blair ('92)**. Todd received his B.S. from Wittenberg University. He will be teaching the combined sections of General Physics, one lab section each of General Physics I and Classical III, and Senior Seminar this fall. He and his friend **Rellen Hardtke**, who is completing her Ph.D. in particle astrophysics at Madison, are taking up residence in Shakopee.

Upgraded Computers in the Physics

This summer all of the physics department lab computers were upgraded to Windows XP. The goal of this upgrade was to take advantage of XP's ease of operation and faster boot times. Although the interface is somewhat different, the operation of these machines should be familiar to everyone, as the networking and programs remain almost the same.

In addition, the eight Modern Lab computers were replaced with post-tornado Omnitechs, which are Pentium

II machines running at a blazing 266 MHz. These machines also received memory upgrades. (This means one fewer excuse for the Experimental Modern Lab students.)

Every student enrolled in a course in the department will receive instructions on the use of the new network during the first week of classes.



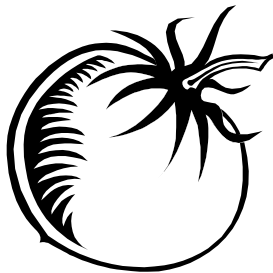
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How I Spent My Summer (by the Physics Faculty)

The faculty members in the department had a busy summer.

A. Jennings Ellis writes: "Other than several trips down to the farm in Iowa and some Minnesota sight-seeing, I have stayed around St. Peter. The tomatoes and okra started early; the raspberries were as prolific as usual, and still are, but the roses have been disappointing this year. I have started filming new versions of the chemistry videos. The technology has progressed remarkably since I started doing this project nine years ago. It is all digital now; in a few months, the last maker of VHS camera will cease production altogether."



"The tomatoes and okra started early; the raspberries were as prolific as usual..."

Dennis Henry writes: "The summer, which seemed to start late and end early, included registering first-year students for two days in June, upgrading the home computer network, and spending a relaxing week at Lake Le Homme Dieu near Alexandria. July was dominated by preparing the lead-off invited lecture on teaching electronics courses at the AAPT summer meetings in Boise, Idaho in early August. It was fun to see former students **Dave Seely ('81)** and **Rauha Rahkola ('97)** there. Another article in the works is on the physics of railroad hump yards for the forthcoming *Encyclopedia of North American Railroads*, being published by Indiana University Press. In late August I attended one day of the IEEE Electromagnetic Compatibility Society International Symposium in Minneapolis, where I heard some interesting papers, saw some neat lab demonstrations, and talked shop with EMC professionals and students."

Tom Huber has been busy with several projects this summer. The major one was a continuation of his work on organ pipe acoustics which is being carried out in collaboration with Charles Hendrickson ('59, owner of Hendrickson Organ Company), Brian Collins ('03), and Mario Pineda Polytec PI Incorporated). He has been busy with analysis of the measurements that were taken in April of the vibrational modes using a Polytec scanning laser vibrometer for different reed organ pipes. A laser vibrometer uses the Doppler shift of reflected light to determine the velocity of a moving surface, in this case the vibrating reed. The results have been quite interesting - the modes are significantly more complicated than previously expected, and yet have some consistency with theoretical models of a vibrating bar. One exciting development in this area; Tom has been able to obtain funds from the Dean's office to purchase a used laser vibrometer. This unit would be worth about \$75,000, but only cost less than 10% of that amount! This will allow him to continue to make exciting measurements in this area. (Advertisement - Tom is looking for students who are interested in working with him on this project). He will be applying for an National Science Foundation grant to allow Gustavus students to work on this project during the next three summers.

Tom also attended the American Association of Physics Teachers meeting in Boise, Idaho in early August. He presented a paper on using portable CD players in the electronics laboratory

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Faculty Summer Activities (concluded)

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(which will be familiar to any students who have taken Electronics I here). On the way back from the meeting, he spent an enjoyable few days in Yellowstone with the family. Finally, Tom has been busy preparing for the fall semester, especially continued refinements of the Experimental Modern Physics course.

Steve Mellema and family made a one-month trip in June to Malaysia, with the primary goal of arranging a Gustavus Travel course there for January Term 2004. Arrangements are now in place for the course, which will expose students to everything from the rich cultural and religious traditions of Asia to the ecology of the tropical rain forest and the surrounding coral reefs. If you're interested, watch for next year's January Term 2004 catalog!

It was a busy summer for **Chuck Niederriter**, beginning with the graduation from St. Peter High of his oldest son, Brad. After all of the party preparations, completion of house projects, and visits from the grandparents, most of the month of June was gone, leaving only a little time before the Niederriter's foreign exchange student returned to Italy. Then there was some time for traveling, camping, and, of course, the annual trip to Pennsylvania. Between all of these activities, Chuck found time to upgrade the physics computers to XP, repair several weather stations, write physlets for the astronomy class and naked eye observing sessions for art history courses, and attend many meetings on campus con-

cerning budget, general education, and a proposal to the Howard Hughes foundation.

Paul Saulnier writes: "The summer of 2002 was filled with research, class prep, and a family vacation. The research consisted of two projects; time-resolved photon correlation spectroscopy and the use of radial distribution functions as a means to study swarming behavior in nature. The first of these projects involves studying the behavior of small particles suspended in a fluid while the second dealt with investigating the organizational structure of swarms in nature as observed under varying conditions. Rob Mark worked on the light scattering experiment while Amit Bohara led the swarm investigation. Significant progress was made in both investigations.



Photographer-induced behavior at the spring physics picnic.



Student Summer Internships

This newsletter is being written before students have returned for the fall semester. However, the following summer internships and research opportunities were reported to Steve Mellema at the end of the spring 2002 semester. As usual, we expect to hear many interesting student talks at SPS meetings this year.

Tutu Adenle ('03), Rose-Hulman.

Troy Anderson ('03), Notre Dame.

Amit Bohara ('03), GAC with Paul Saulnier.

Erik Brekke ('03), Materials Science, Northwestern University.

Brian Collins ('03), Materials Research Science and Engineering Center, University of Minnesota.

Chad Custer ('03), National Institute of Standards and Technology.

Melissa Haugen ('03), University of Toledo.

Jeremiah Jazdzewski ('03), Materials Research Science and Engineering Center, University of Minnesota.

Andy Konicek ('04), Electrical Engineering, Mayo Clinic.

Rob Mark ('03), GAC with Paul Saulnier.

Eric Nordberg ('03), Characterization Facility, University of Minnesota, working with **Greg Haugstad** ('85).

Andy Ohrt ('02), Center for Global & Regional Environmental Research, University of Iowa.

Kevin Quealy ('03), University of Milwaukee.

Tom Schmit ('03), Materials Science, Cornell University.

Scott Stephens ('03), Michigan State.

Would you like to do a summer internship?

A high percentage of our majors will complete at least one research internship or experience before they graduate from Gustavus.. These experiences take place in the summers between the sophomore and junior or the junior and senior years, but there are programs that will accept students between their freshman and sophomore years.

A research experience is valuable in many ways. It gives students a taste of what the "real world" of research is like and helps them to plan for future graduate studies and jobs. And, in both those cases, having such an internship on your resume can open a lot of doors.

So, if the kinds of appointments listed at the left and described by students in SPS meetings this year sound interesting, talk to your advisor or to Tom Huber, who is the department's internship coordinator.





Visiting Lecturers and Alumni



The department's program of outside speakers and the many SPS meetings brought a rich and varied group of speakers to the campus. Pictured above are eight physics alums who gathered to tell students and faculty what the real world was like. From left to right they are **Kari Treichel** ('96), **Kris Fredrick** ('96), **Rob Corey** ('95) and his friend who is studying medicine, **Aaron Schmidt** ('95), **Scott Blomberg** ('90), **Erik Therien** ('92), **Ben Leadholm** ('90), and **Phil Miesle** ('95).

Dr. Thomas Rossing, Northern Illinois University, "The Physics of Guitars," October 11, 2001.

Mr. Kevin Buchs ('82), Mayo Foundation, "Research in Electrical Engineering at the Mayo Foundation," October 24, 2001.

Dr. Doug Finnemore, Iowa State University, "Superconductivity in MgB_2 ," November 5, 2001.

Dr. Nathan Miller ('97), University of Wisconsin-Madison, "Using NASA's New Chandra X-ray Observatory to Probe Hot Star Winds," November 19, 2001.

Dr. John Huchra, Harvard-Smithsonian Center for Astrophysics, Harlow-Shapley Lectures: "Large Scale Structure of the Universe" and "Age and Fate of the Universe," March 4-5, 2002.

Dr. Laurie McNeil, University of North Carolina at Chapel Hill, Gustavus Lecture Series: "Optical Materials Today" and "Physics of Optical Materials," April 9-10, 2002.



Graduating Class of 2002



Commencement ceremonies are always memorable, but they do tend to follow a template. Not this year. The predicted rain soaked those marching as well as the assembled multitude on Hollingsworth Field. A disorderly retreat to the Lund Arena was announced, followed by a much abbreviated and yet meaningful approximations to the key elements of the program. We had our traditional reception in the Olin lounge, at which each of the 12 seniors introduced himself or herself to the families and friends, and talked about future plans. Again, from Steve Mellema's board, we report:

Corey Bishman ('02), seeking technical employment.

Mike Bland ('02), Geophysics, University of Arizona.

Lance Breitenbach ('02), Aerospace Engineering, Old Dominion University

Paul Good ('02), Astrophysics, University of Iowa.

Amanda Havnen ('02), Medical Engineering, Wake Forest University.

Jon Jennings ('02), candidate for position in actuarial firm, Lincoln, Nebraska.

Todd Johnson ('02), Physics, University of Wisconsin-Madison.

Jon Miller ('02), Theoretical Physics, University of Maryland-College Park.

Matthew Miller ('02), Physics, University of Wisconsin-Madison.

David Paulsen ('02), Dual-Degree in Electrical Engineering, Minnesota State-Mankato.

Andy Ohrt ('02), Dual-Degree in Mechanical Engineering, University of Minnesota.

Laura Owen ('02), Materials Science, Washington State University-Pullman.



Members of the Class of 2005 practice for their graduation



Study Abroad Possibilities

Gustavus has one of the highest percentages in the country of students who choose to study abroad during their college career. For physics majors, careful planning for a study abroad experience is essential, given the highly sequential nature of the courses required for the major and for adequate graduate-school or career preparation. There are several study-abroad programs available that can integrate more easily with our major.

The semester- or year-long program with the physics department at the University of Wollongong in Australia allows students to take a full range of physics courses.

There are also programs at the University of Lancaster, England, and the Gustavus exchange program with the Science University of Malaysia. None of these programs requires any knowledge of a foreign language, and courses may be taken to fulfill both physics-major and general-education requirements.

Be sure to talk with your advisor if you are interested in studying abroad.

For more information contact the Office of International Education located in the International Center next door to Olin Hall. The study-abroad coordinator is Carol Moline (x7546).



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We're on the web!
<http://physics.gac.edu>

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, the fall activity calendar, and a users' guide to the physics software on the department's computer network. Seniors have received copies of the new edition of the AAPT brochure "Planning for Graduate Studies in Physics and Related Fields", written by Dennis Henry, and juniors will receive copies this fall.

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 mentioned in this newsletter.

January Term 2003

The Physics Department will offer four courses this coming year.

Dennis Henry will be again be teaching PHY310, Electronics and Instrumentation II. The prerequisite for this course is PHY270, Electronics and Instrumentation I. This course will move to an alternate-year January-Term-only pattern after 2003.

Paul Saulnier will be teaching PHY100 Physical World, for its first offering in some years, and the first in January Term. This course provides a one-semester introduction to classical and modern physics for students outside the sciences. It is being offered with a focus on students meeting requirements in teacher education.

Todd Coleman plans to offer an introductory course in particle physics, accessible to students who have completed the Classical Physics sequence. Students interested in this course should see Todd for more information.

Chuck and Debbie Niederriter will again be teaching PHY112, Australia-Astronomy of the Southern Skies, but this popular course is already full, with a waiting list. Interested students should contact Chuck.

