GUSTAVUS ADOLPHUS COLLEGE
PHYSICS DEPARTMENT

September 2003

Web Edition

Gustavus Physics

Radiations from Olin Hall

Inside this issue:

This annual newsletter captures highlights of the 2002-2003 academic year and summer, news from current students, recent graduates and faculty, and information about the physics program for the year ahead. An online version with color photos will be available at http://physics.gustavus.edu early in the fall semester.

A record number of Gustavus physics students engaged in funded research with faculty in Olin Hall this summer. (See following columns and photos for these and other stories.) Forty-eight students, the highest number in recent years, are enrolled in Classical Physics I, and the Class of 2004 is expected to exceed our long-time average of 13 graduates. Members of the Class of 2003 have embarked on a variety of graduate and professional degree programs and careers across the country. Four faculty attended the summer meeting of the American Association of Physics Teachers in Madison, Wisconsin, and three presented papers.

Fall Semester 2003

Dates to Remember

- Sep. 3 Classes begin
- Oct. 7-8 Nobel Conference
- Oct. 17-20 Fall Break
- Nov. 11-25 January Term and Spring Registration
- Nov. 27-30 Thanksgiving Break
- Dec. 15-18 Final Exams

Students Receive Departmental Awards

Each year the physics department recognizes physics students for their achievements with a variety of awards, scholarships, and nominations.

Andy Konicek ('04) has been selected as the winner 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 rising senior physics major on the basis of interests and scholarly achievements.

Scott Ernst ('04) has received the Gerald and Julia Swanson Scholarship in Physics. This scholarship was established to honor the work of the physics

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Annual Student Awards

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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.

Josh Steffenson ('04) 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.

Mark Berger ('04) was selected to receive the Julian A. Crawford Memorial Prize in Physics. This prize consists of a check, of the right amount for membership in AAPT or a professional society of the student's choice. The prize is named in memory of the former chair of the Gustavus physics department (1967-69).

In consultation with the Physics Department, the Department of Mathematics/Computer Science has chosen **Jason Crnkovic ('04)** as the winner of the 2003-2004 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.

Jason Crnkovic and **Scott Ernst** have also been named Physics Departmental Assistants for Fall Semester, 2002. Each 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. Two other seniors will be appointed for the spring term.

Josh Jacobson ('06) received the Harold Q Fuller Memorial Award in Physics, which is given to the first-year student who has the highest overall record in Classical Physics I and II.

Joe Rodriguez ('04) received the Positive Derivative Award for a rising senior, and **Jared Lee ('05)** and **David Fowler ('05)** (the latter pictured below) received the awards for their class. These awards are given to students in recognition of their improvement in physics, and promise of future achievements. The award consists of a check adequate to pay for a yearly student membership in AAPT, SPS, IEEE, ASME, or a similar organization.

David Fowler receives his award from Prof. Henry

SPS Officers for 2003-04

Gustavus has an active Society of Physics Students Chapter. The first meeting will occur early in the fall semester, at which time the new officers (listed below) will outline their plans for fall activities. The faculty will also make brief presentations about the kinds of research and course development projects with which they are involved.

Senior Co-President: **Scott Ernst ('04)**
Junior Co-President: **Carl Ferkinhoff ('05)**
Treasurer: **Dave Kupka ('04)**
Activities Coordinator: **Matt Treichel ('04)**
Sophomore Rep: **Erika Galazen ('06)**

Faculty Activities

Tom Huber is on sabbatical leave this year and has been busy planning and carrying out a variety of projects this summer. First of all, he has been working on a presentation and papers on some of his work with organ pipes. He has also been working on grant proposals for next summer. "Maybe the third time will be a charm with NSF, or else there are other possible funding agencies. Stay tuned for opportunities for summer internships."

Another project that has kept him busy is making refinements in the Modelfit package. Users should see some of the new features when they run this with Sigmaplot this year. He is also completing a version for Excel. Any students with an interest in programming should contact him - there are some interesting projects in this area. He also did some work with the newest version of LabVIEW, in preparation for its eventual introduction into our lab courses.

During the rest of his leave he will be working on a number of different projects in acoustics, computational physics, demonstrations, course preparation, and other areas. He will have projects available for all levels of students in a broad range of areas. "Feel free to stop by if you are interested."

Tom has generously offered to continue to serve during his sabbatical as Pre-Engineering Advisor and Dual-Degree Officer, as well as provide library liaison and internship oversight.

Steve Mellema has returned from his 2002-2003 sabbatical leave. He spent six months as a Fulbright Fellow attached to the School of Physics at *Universiti Sains Malaysia* (the Science University of Malaysia) in Penang. During his time there, he taught one course and also traveled around the country giving presentations and workshops about the creation of web-based materials for teaching physics. Since returning from Malaysia in mid-April, he has worked on a variety of home projects, from carpentry to painting. This summer he has also

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Physics Computer Network Management

After many years during which either Chuck Niederriter and/or Steve Mellema took on the heavy tasks of maintaining and managing the physics computer network and workstations, the department has embarked on a new model, until permanent technical staff is in place. In June, Dennis Henry and Chuck Niederriter solicited bids from and interviewed four Mankato-area computer support companies, whose services were considered for contract hiring on an hourly basis during the coming academic year. In mid-July, Information Technology Professionals, Inc. was hired to provide maintenance and support for the physics network through the start of classes. In late September the department moved its outside contracting to Venture Computer Systems. Steve is providing primary liaison duties between the department and the outside technician, while still doing triage on the daily problems. Reports of problems should be brought to his attention, or to the course instructor.

New students enrolled in a course in the department will receive instructions on the use of the physics network during the first weeks of classes.

"I thought that you saved the data file. Oops!"

Faculty Activities (continued from p. 3)

(Continued from page 3)

worked on experimental research in optical scattering with **Tutu Adenle ('03).** In early August he traveled to Madison, Wisconsin to present a paper at the national meeting of the American Association of Physics Teachers. The paper, entitled "Bilingual Physlet Illustrations to Ease the Language Transition in Malaysia", related some of his experiences during the Fulbright visit. Steve has also been finalizing details for a January Term 2004 Gustavus Travel course, "Malaysia: Nature, Culture and Development". There are still a few places open in the course, which will expose students to everything from the rich cultural and religious traditions of Asia to the ecology of the tropical train forest and the surrounding coral reefs. If you're interested, don't miss the travel course registration deadline of September 30th!

Chuck Niederriter had a busy summer, filled with research, recreation, and service. "It seems like the school year hadn't even ended when the research in acoustic scattering with **Andy Konicek ('04)** began. In fact, it was the day after graduation. The acoustics research had its ups and downs, but substantial progress was made. In addition, Chuck helped the environmental chemistry group collect samples in Voyagers National Park, during a four-day trip consisting of boat camping, canoe camping, and lots of hiking. There was also some time for moving the wind power project forward, which should culminate in the installation of a 50-m monitoring tower early this fall. Several days were spent helping with the construction of a house for Habitat for Humanity. In early August Chuck attended the AAPT meeting in Madison, serving as Minnesota section representative, giving a talk, learning what is new in physics and astronomy education, and visiting with alumni and colleagues from across the country. Of course, there were weekend camping trips and the usual trip to Pennsylvania in August to visit family. All in all, it was a successful summer."

Chuck continues as Advisor to The Society of Physics Students Chapter, as Co-Director of General Education for the College, and as a member of the Faculty Compensation Committee, among other roles. He will again be supervising the department's tutoring program, and the evening observatory schedule.

Dennis Henry spent most of the summer in St. Peter, involved with department administration, course material preparation, and manuscript reviewing. He joined his colleagues at the Madison AAPT meetings, and pulled together an enjoyable dinner reunion with faculty and alumni **Glennys Mensing ('89)**, **Heidi Manning ('90)**, **Jeff Nelson ('92)**, and **Tammy Rademacher ('96)**. On the way back to St. Peter he made a small detour to enable a brief stay in Ripon, Wisconsin, where he visited old friends and places from his grade school days.

Research projects included work on an invited paper on the history of St. Paul Union Depot, scheduled to be presented at the annual meeting of the Lexington Group in Transportation History in early October. He also made progress learning video software and getting 15 kilo-feet of railroad and family movies transferred into formats that are more accessible (although less permanent) than the originals.

"D.C." begins this second year of his fourth three-year term as department chair, and looks forward to working with students on research projects involving electromagnetic interference and experiment development. He was elected to the College's Academic Operations Committee, and will continue to work for more per-

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Faculty Activities (concluded)

(Continued from page 4)

manent solutions to the problems of technical support for computers and other departmental infrastructure.

Paul Saulnier had a busy summer supervising four students on funded research, and presenting a paper at the Madison AAPT meeting. In mid-summer he received word that he had won his third external grant this year, amounting to $198,435 from the Major Research Instrumentation Program (MRI) of the National Science Foundation (NSF). A fourth joint proposal for an NSF-RUI grant is pending. Congratulations, Paul!

Paul was elected to the Faculty Personnel Committee this spring, and will continue to direct the Faculty Shop Talks series on campus. Paul will continue to coordinate the department's colloquium program, which hosted a series of interesting speakers, as highlighted on page 7.

Jennings Ellis reports a summer of service to his church and extended family.

"I have a cousin in southern Iowa, who has COPD, which is reduced lung function. He is 12 years older than I. Another operation could repair his condition of an inability to walk, but the anesthesiologists will not allow the surgery because of the impaired lung function, due to smoking PALL MALL's (he quit years ago). Lesson: PLEASE DO NOT SMOKE. I will be visiting him again this week (Aug. 19) as I did in late June. Lesson: please visit family and friends who need you for whatever reason."

"The more encompassing part of my summer was the General Convention of the Episcopal Church of the United States of America (ECUSA), also known as the Domestic and Foreign Missionary Society (DFMS, www.dfms.org <http://www.dfms.org>). I put about a month's worth of days into this adventure in all. The single most concentrated period of time was during the convention itself, July 29-Aug 8, when I was a supervisor of volunteers in the Secretariat of the ECW (Episcopal Church Women.) A pair of controversial issues overwhelmed the General Convention of the Episcopal Church at General Convention. These issues concerned sexuality."

As in recent years, Jennings is in charge of the General Physics lab sections, and two larger course labs, General Chemistry and Organic Chemistry. He shuttles between those labs, and offices in Nobel 108 and Olin 204. He anticipates that the weekly meeting for General Physics I lab assistants will be on Friday afternoon.

Benjamin Bousquet has joined the department as Tom Huber's sabbatical leave replacement. Ben completed his Ph.D. thesis on experimental high energy physics, and successfully defended it on September 23 at the University of Minnesota. This fall, Ben is teaching General Physics I and one section of that lab, as well as PHY-399 Senior Seminar. His office is OHS 212. Welcome, Ben!

It was great to see **Richard and Judy Fuller** in Olin in July, and learn of their many volunteer and learning activities in the Twin Cities. They have just sold their house in Roseville and bought a condo in Falcon Heights, in a development for faculty and alumni of the University of Minnesota. They can be reached at:

1066 Coffman Street, #212
Falcon Heights, MN 55108
rmfuller@gustavus.edu

We look forward to seeing Dick in Olin this fall for his "Manhattan Project" talk in CUR-360.

Student Summer Internships

This newsletter went to press before students returned for the fall semester, but we had received information on the following summer internships and research opportunities. Please advise the editor of any additions. As usual, we expect to hear many interesting student SPS talks based on their work and experiences.

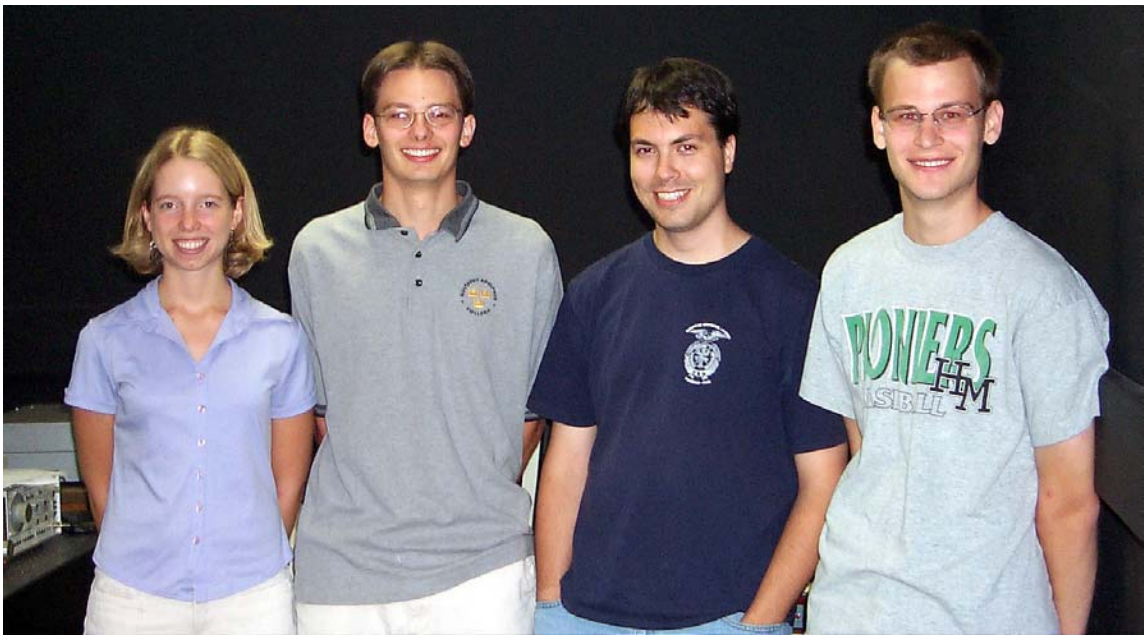
Tutu Adenle ('03), GAC with Steve Mellema
Amit Bohara ('04), ONR at Woods Hole
Cory Christenson ('05), GAC with Paul Saulnier, supported by Petroleum Research Foundation Grant
Jason Crnkovic ('04), NSF-RUI in physics at University of Illinois, Champaign-Urbana
Scott Ernst ('04), GAC with Paul Saulnier, supported by NSF-RUI grant
Sarah Handahl ('03), Minnetronix intern
Nathan Johnson ('04), GAC with Paul Saulnier, supported by NSF-RUI
Andy Konicek ('04), GAC with Chuck Niederriter, supported by Presidential Fund grant
Eric Nordberg ('03), Seagate intern, Edina
Kathlyn Wells ('04), Astrophysics REU, Michigan State
Kelly Younge ('05), GAC with Paul Saulnier, supported by PRF grant

Would you like to do a summer internship or research experience?

A high percentage of our majors will complete at least one research internship or experience before they graduate from Gustavus.. These experiences take most often place during 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, and a few for graduates.

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. Check the bulletin board outside room 206 for postings of announcements that have been received by the department.



Paul's hard-working quartet (left to right):

Kelly Younge
Cory Christenson
Scott Ernst
Nate Johnson

Visiting Speakers

The department's program is enriched by colloquia given by outside speakers, and by SPS meetings conducted by students and faculty who give presentations about their internships and research experiences. Paul Saulnier coordinates these colloquia, which were conducted by the following speakers:

Dr. Rellen Hardtke, Physics Department, University of Wisconsin, Madison, "The Search for Gamma-Ray Burst Neutrinos from the Earth's South Pole," September 17, 2002

Dr. Tar-pin Chen, Physics Department, University of North Dakota, "The Hope for Superconductivity in Electronics," September 26, 2002

Dr. Norbert Mulders, Department of Physics, University of Delaware, "Superfluidity", October 7, 2002

Dr. John Lajoie, Department of Physics, Iowa State University, "Baby Pictures of the Universe: Creating New States of Matter at RHIC," November 5, 2002

Mr. Rauha Rahkola ('97), Ph.D. Candidate, Department of Physics, University of Oregon, "Catch the Gravity Wave: Searching for Einstein's Elusive Prediction," November 25, 2002

Dr. Jochen Mueller, Department of Physics, University of Minnesota: "The Physics and Biology of Signal Fluctuations at the Single Molecule Level," February 20, 2003

Dr. James Lawler, Physics Department, University of Wisconsin-Madison, "Atomic Physics of Light Sources," March 11, 2003

Dr. Steven Girshick, Department of Mechanical Engineering, University of Minnesota, ", April 10, 2003

Visiting Faculty

Visiting Assistant Professor **Todd Coleman** (pictured above) joined the department for 2002-03 as Steve Mellema's sabbatical leave replacement. Todd completed his Ph.D. in theoretical particle physics at the University of Wisconsin-Madison, and taught the General Physics sequence, Senior Seminar, Modern Physics, a J-Term course in Particle Physics, and several lab sections. In April he accepted the position of Visiting Assistant Professor of Physics at the Joint Science Department of Claremont-McKenna and Scripps Colleges in Pomona, CA.

Visiting Assistant Professor **Rellen Hardtke** (also above) joined us for the spring 2003 semester, filling course vacancies created by Richard Fuller's retirement and Chuck Niederriter's assignment as Co-Director of General Education. Rellen completed her Ph.D. in experimental particle astrophysics at the University of Wisconsin-Madison. She taught Classical Physics II and Astrophysics. She was appointed in April to a tenure-track Assistant Professor position at California State Polytechnic University at Pomona.

This summer Todd and Rellen were married, and returned to Madison to extended their Ph.D. work before moving to California. We wish them all the best in their careers and partnership.

Graduating Class of 2003

The Class of 2003 marked its departure from campus on June 1 with an extended, but dry commencement ceremony, followed by the traditional department reception in the Olin lounge. They are identified below, with their post-graduate plans (from left to right.)

Rob Mark, Graduate Teaching Assistant, Electrical Engineering, Vanderbilt
Erik Brekke, Graduate Teaching Assistant, Physics, University of Wisconsin-Madison
Sarah Handahl, Graduate Research Assistant, Bio-Medical Engineering, Univ. of Minnesota
Melissa Haugen, Graduate Fellowships in Materials Science, University of Minnesota
Sean Hosein, Graduate Studies in Electrical Engineering, University of Minnesota
Kevin Quealy, Summer Boys Camp Leader, then Peace Corps (location TBA)
Jim McHugh, Law School, University of Iowa
Paul Saulnier, Associate Professor
Tom Schmit, Graduate Assistant, Construction Engineering, Purdue University
Scott Stephens, Graduate Teaching Assistant with Fellowship, Physics, Univ. of Delaware
Todd Coleman, Visiting Assistant Professor
Brian Collins, Graduate Teaching Assistant, Physics, University of North Carolina at Chapel Hill
Dennis Henry, Professor and Chair
Chad Custer, Graduate Assistant, Mechanical Engineering, Old Dominion University
Tom Huber, Associate Professor
Jeremiah Jazdzewski, Site Design Technician, LHB Engineers, Duluth
Steven Mellema, Professor
Chuck Niederriter, Professor
Justin Caldwell, postponing graduate studies in medical physics, pending employment
Eric Nordberg, Graduate Teaching Assistant, Physics, University of Wisconsin-Madison

Not pictured: **Tutu Adenle**, Graduate Studies, Electrical Engineering, Marquette; **Troy Anderson**, Graduate Fellowship in Bio-Medical Engineering, Johns Hopkins University; **Rellen Hardtke**, Visiting Assistant Professor; **A. Jennings Ellis**, Adjunct Instructor

Members of the Class of 2005 explore radial symmetry

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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.

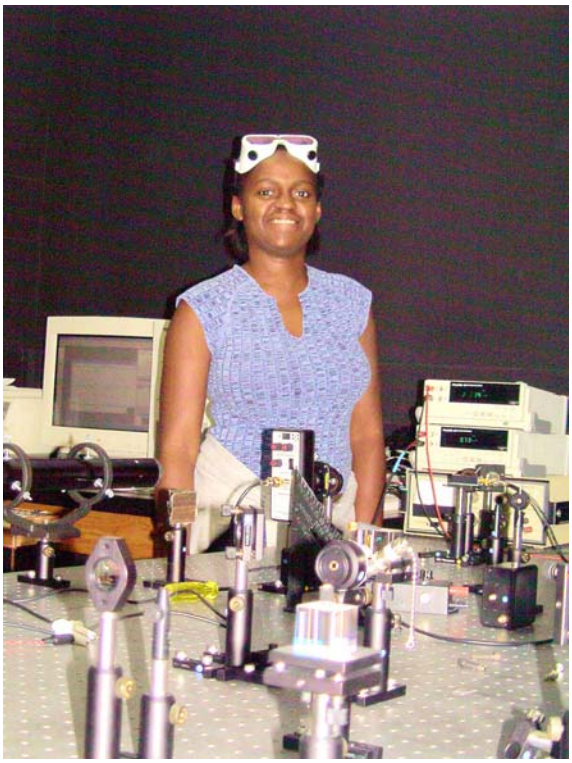
There are also programs at the University of Lancaster, England, and the Gustavus exchange program with the Science University of Malaysia. None of these programs requires any knowledge of a foreign language, and courses may be taken to fulfill both physics-major and general-education requirements.

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).

"There are several study-abroad programs available that can more easily integrate with our major."

Photo Gallery



Tutu Adenle ('03) takes a photo break in Steve Mellema's optical scattering lab.

After chasing (and catching) Paul Saulnier, Sean Hosein ('03) felt obliged to carry him back to the spring picnic.

Andy Konicek ('04) waits by the pond for the rest of his fishing tackle to arrive in Chuck's acoustical scattering lab. They reported catching their limit of under-performing op amps.

Photo Gallery

SPS members Christenson, Johnson, Hayek, Ferkinhoff, and Lee suggest alternate approaches to solving baseball ballistics problems during a Twins Game.

Chefs LoFaro, Henry, and Niederriter take their grilling seriously.

GUSTAVUS ADOLPHUS COLLEGE

Olin Hall
800 West College Avenue

Phone: 507-933-7308
Fax: 507-933-6104

Editor: Dennis C. Henry
Photographers: Chuck Niederriter
Carl Ferkinhoff ('05)
E-mail: dchenry@gustavus.edu

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 and a users' guide to the physics software on the department's computer network. Seniors have received copies of the second 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 January and Spring registration, research opportunities, pre-professional and graduate studies, Study Abroad, or any other items of mutual interest.

January Term 2004

Three physics faculty will offer January Term courses this year.

Steve Mellema and his wife, Shirley, will lead the travel course NDL-134 Malaysia Culture, to explore one of the most fascinating places in the world. The class will travel to Malaysia, at the heart of Southeast Asia. Because of its central location and the large immigration that took place during the 20th century, Malaysia has evolved into a multicultural, multireligious society. The three major racial/cultural groups of Asia - the Chinese, the Indians and the Malays - all live together in a society that contains substantial representation from every major world religion. The deadline for registration is Sept. 30.

Paul Saulnier will be teaching NDL-136 Science Fiction Film. This course will trace the history of science fiction film from its inception to the modern era. The various artistic cinematic styles represented by these films will be examined in detail --- from the expressionism of Metropolis to the future noir style of Blade Runner. In addition to the historical and artistic aspects of these films, the cultural impact of the genre throughout time will also be discussed.

Benjamin Bousquet will be teaching PHY-330 Nuclear Physics.

Dennis Henry, Chuck Niederriter, and **Tom Huber** are taking leaves this January, and will be working on a variety of course development and research projects.