

Physics and Astronomy at SUNY Geneseo

This is an exciting time for the Department of Physics and Astronomy at SUNY Geneseo. We have recently moved into a new Integrated Science Center (ISC) which includes new labs, teaching spaces, and state-of-the-art research-grade equipment. Our faculty have maintained and expanded on our long-standing tradition of actively engaging our students in undergraduate research projects and have secured numerous major external grants for work with undergraduates. We have recently redesigned our introductory physics curriculum and have adopted many innovative technologically-based instructional methods in our classes. Our department has seen a dramatic increase in number of physics majors in recent years, and is a leader nationwide for production of quality physics majors at primarily undergraduate institutions (PUI).



Figure 1: The new Integrated Science Center, completed in 2008, is home to the Department of Physics and Astronomy at SUNY Geneseo.

Starting with its founding in 1963 by the legendary Robert “Duke” Sells, the department of Physics and Astronomy at SUNY Geneseo has a long tradition of excellence in undergraduate education. Currently, the department consists of 9 full-time faculty members, a department secretary, and an instructional support specialist. Each faculty member in the department is active in research and supports numerous undergraduates via directed studies, senior thesis projects, and paid summer research positions. The department was selected for inclusion as a case study as a “thriving department” in the American Physical Society’s Strategic Programs for Innovations in Undergraduate Physics (SPIN-UP) report from January 2003, and has continued to attract a large number of very talented students to its program. We are very proud of the quality of education that we provide to our students. The faculty, staff, and students all work together in a collaborative environment to make our department one of the best of its kind in the nation.

Preparing students for careers in physics, engineering and other technical fields

Physics majors at Geneseo learn problem solving techniques and analytical skills, and get hands-on experience training. These skills make our majors highly sought after in a wide variety of careers. Many go on to graduate school to pursue advanced degrees in physics, engineering, and other related fields. Many enter the workforce immediately following graduation and work in a variety of technical capacities. Others pursue careers in education. We are very proud of the

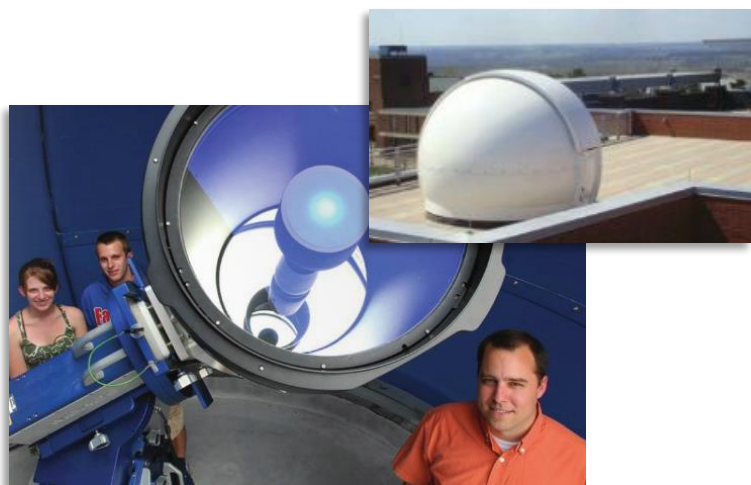


Figure 2: Dr. Steinhauer and two students with the new 20-inch reflecting telescope. The insert shows the observatory dome mounted on the roof of the ISC.

accomplishments of our alumni in many areas. To help prepare students for graduate school, we hold a “Graduate School Night” each fall, organized by one of our faculty members, in which we share information about graduate school. The department is also part of the College-wide “Celebrate the Sciences” event, in which our department invites some of our distinguished alumni back to campus to serve as panelists for an open-ended discussion with students on how to succeed with a physics degree “in the real world.” These and other events ensure that our students are well prepared for a wide variety of careers using their physics degree.

Size of physics program at SUNY Geneseo

With over 230 majors currently in our physics program, the Department of Physics and Astronomy at SUNY Geneseo is one of the largest of its kind in the nation. According to the most recent “Roster of Physics Departments with Enrollment and Degree Data 2013”¹ published by the American Institute of Physics (AIP) in August 2014, our department ranks 1st among a total of 554 primarily undergraduate institutions in the U.S. for number of undergraduate physics degrees conferred in the class of 2013. The size of our program means that there are numerous opportunities for students to take specialty classes in physics including Astrophysics, Solid State Physics, Atomic and Nuclear Physics, General Relativity, etc.



Figure 3: The new 1.7 MV Pelletron accelerator at SUNY Geneseo, installed in 2007.

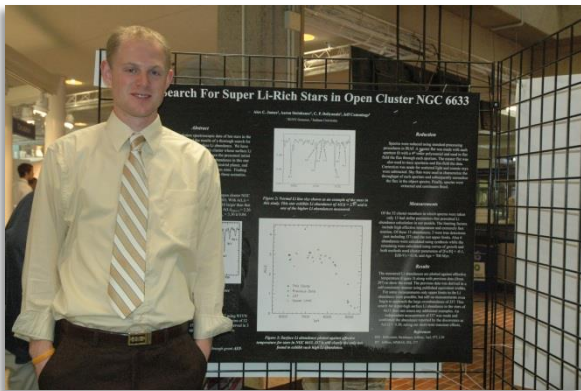


Figure 2: A student shows off his poster at a local research symposium held at SUNY Geneseo.

Undergraduate research

Our department prides itself by providing a wide range of opportunities for undergraduate research. Each of the 8 faculty members is active in research and supervises numerous student projects each year. During the academic year 2013-2014, our faculty members supervised over 40 student research projects. Many students also work as paid research assistants during the summer. Many of these research projects lead to presentations at local and national conferences and to peer-reviewed publications. Our department has fared very well in recent years in securing numerous

external research grants to support our work with undergraduate students. Data from the office of institutional research at SUNY Geneseo show that the physics department leads the campus by a considerable margin in external grant expenditures over the past 10 years.

Educational transformation

In order to graduate with a physics degree, students must complete one of two capstone courses, either PHYS 363: Instrumentation and Interfacing or PHYS 372: Undergraduate Research. Each course requires a long term independent project to be completed by the student. In PHYS 363, students use the popular computer interfacing program LabVIEW to complete a project in which the computer processes data from a sensor and then uses this data to control various hardware devices. Students plan and design their own projects, and then proudly show off their work at the “LabVIEW Fair” held at the end of each semester. In PHYS 372, students work on an independent



Figure 3: A student shows off his PHYS 363 final project.

¹ <http://www.aip.org/statistics/reports/roster-physics-2013>

research project under close supervision of a faculty member. Project proposals are written by the student in consultation with the supervising faculty member and then approved by the entire department. Many of the student projects lead to presentations at national or regional conferences.

Our department applied for and was awarded a local grant from the College in order to develop a “Particle Accelerator Field School” course to which was taught during Summer 2013. This course was designed to provide a high-impact learning experience for our senior physics majors. Students enrolled in this summer course complete hands-on training on the operating procedures for the 1.7 MV Pelletron accelerator and complete a group project involving the accelerator.

Other activities

Our department has long believed that one of its keys to success has been the close contact with students outside of the classroom. This creates a genuine learning community in which ideas can be shared freely between students and faculty, and creativity can flourish. In order to promote this kind of interaction, our department along with the Physics Club and the Astronomy Club sponsors many student/faculty social events throughout the year. Below is a list of the events that were held this past 2013-2014 academic year:

- Freshman Pizza Mixer, September 2013
- Physics Club Picnic at Highland Park, September, 2013
- Sigma Pi Sigma Induction Ceremony and Dinner, January, 2013
- Women in Physics Mixer, Milne Library, January 2013
- G.R.E.A.T Day , Student research symposium, April 2014
- Annual “Physics Bowl” Competition, April, 2014
- Annual Bridge Building Contest, April, 2014
- Physics Spring Picnic, Doty Park, April, 2014
- Physics Junior-Senior Dinner, Valley Oak Event Center, May, 2014
- Physics Graduation Luncheon, ISC Physics & Astronomy, May, 2014
- Thursday Afternoon Physics & Astronomy Colloquia (every Thursday during academic year)
- Numerous informal student/faculty ultimate Frisbee games or Disc Golf outings



Figure 6: A crew poses for a picture after our Sigma Pi Sigma induction ceremony.



Figure 7: Two students show off their bridge during this year's very popular bridge building contest as Dr. Pogozelski looks on.

Faculty and staff bios

Stephen Padalino obtained his Ph.D. in experimental nuclear physics in 1985 from Florida State University and currently holds the highest rank in the SUNY system, Distinguished Teaching Professor. Padalino joined the Department of Physics and Astronomy at SUNY Geneseo in 1985 and has won numerous awards for teaching, research, scholarship, and for mentoring of undergraduates. In 2001, Padalino was recognized by the Council for Advancement and Support of Education (CASE) as “Professor of the Year” for all of New York State. Dr. Padalino is the leader and project director for the Nuclear Diagnostics group, which works in collaboration with the Laboratory for Laser Energetics (LLE) at the University of Rochester and the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory. Padalino is an enthusiastic and creative teacher, mentor, and researcher who has supervised more than 100 student projects and has secured more than \$4.7 million in research funding since coming to Geneseo.



Kurt Fletcher joined the physics department at SUNY Geneseo in 1993, shortly after earning a Ph.D. degree in experimental nuclear physics from the University of North Carolina at Chapel Hill. In 2011, Fletcher was promoted to the highest rank in the SUNY system, Distinguished Teaching Professor. Fletcher served as department chair for over nine years and took the lead in planning and administering the department’s transition into the new Integrated Science Center. Fletcher has won numerous awards for faculty mentoring, excellence in teaching, and was named a Distinguished Alumnus of Jamestown Community College. Fletcher is an active researcher with expertise in nuclear diagnostics and low energy nuclear physics and is a member of the LLE nuclear diagnostics collaboration. Widely admired on campus as a dynamic and engaging teacher, Fletcher is also project director for the Power of Physical Science (POPS) grant, supported by the NSF to encourage young girls to pursue careers in the physical sciences.

In 1993, **Savi Iyer** earned a Ph.D. in general relativity from the University of Pittsburgh and came to SUNY Geneseo as an adjunct lecturer that same year. Iyer joined the tenure track at SUNY Geneseo in 1996, and in 2010 she was promoted to Full Professor. Currently, Iyer is serving the College in her role as Associate Dean of the College. Iyer has supervised numerous directed studies has creatively involved undergraduates in all phases of her research, which lies in the field of general relativity and in particular the study of black holes. Even with her full workload and responsibilities in the Dean’s office, Iyer has continued to be an energetic contributor to the department by supervising undergraduate research projects and teaching courses. Iyer is a dedicated and thorough teacher and a deeply committed advisor to students in our program. In 2005, Iyer was awarded the SUNY Geneseo Presidential Award for Excellence in Academic Advising.



Charlie Freeman came to SUNY Geneseo in 1997 from the University of Rochester, where he earned a Ph.D. degree in experimental nuclear physics. Freeman is currently serving the department as Acting Chair. With expertise and a background in accelerator physics, Freeman serves as Director of the 1.7 MV Tandem Pelletron Accelerator and oversaw the planning for and installation of this machine in 2007. Freeman is a member of the nuclear diagnostics collaboration and has supervised a large number of students in undergraduate research projects using the Pelletron accelerator. Freeman also lectures frequently to a wide variety of audiences on the physics of baseball. Freeman was recognized by the College's Teaching and Learning Center for outstanding teaching in 2009.



Ed Pogozelski began his career at SUNY Geneseo in 1997 as an adjunct lecturer, and joined the tenure track in 1999. With a Ph.D. in mechanical engineering from the Johns Hopkins University, Pogozelski serves an invaluable role to the College as the coordinator for the 3/2 cooperative engineering program and also provides guidance and advice to the large number of physics majors who are interested in careers in the engineering fields. Pogozelski has a remarkable track record of involving numerous students in directed study and independent research projects and is an active member of the nuclear diagnostics group where he has taken on a wide variety of diverse projects in the field. Pogozelski is admired by his students for his outstanding and well prepared courses, and was awarded the Chancellor's Award for

Excellence in Teaching in 2004.

James McLean received his Ph.D. in condensed matter physics from Cornell in 1996 and came to SUNY Geneseo in 1999 following a post-doc appointment at UCSD. Recently, McLean has been active in a project funded by NYSTAR to perform detailed numerical simulations of the effectiveness of the Magscore bulletproof armor system. McLean developed and published a study guide for courses on the science of sound entitled "*The Sound of Physics*" (Kendall/Hunt Publishing, 2005) and is performing research on the air flow through trumpets. Currently, McLean serves as director of the new scanning probe microscopy lab, which consists of an atomic force microscope and a near-field scanning optical microscope. McLean is an enthusiastic and innovative teacher who is very active in many research projects with students.



Known as our "resident astronomer," **Aaron Steinhauer** received his Ph.D. in astronomy from the University of Indiana in 2003 and came to Geneseo in 2005 from the University of Florida, where he held a post-doc appointment. Steinhauer's expertise lies in the study of the abundances of light elements in stars, and in particular the study of the Lithium gap observed in certain open clusters of stars. Steinhauer routinely brings groups of Geneseo undergraduates to the Kitt Peak National Observatory in Arizona for observing runs on the WIYN observatory and the Mayall 4-meter telescope. Steinhauer is an energetic teacher whose Introductory Astronomy course has become one of the most popular on campus. Steinhauer is very active in undergraduate research and supervises numerous students during the academic year and also during the summer on a variety of projects.

George Marcus came to Geneseo in 2006 from Stanford University, where he held a post-doc appointment. Marcus earned his Ph.D. in physics from Stanford University in 2005, with specialty in the field of optics. In particular, Marcus's primary research lies in the field of cavity enhanced spectroscopy (CES), with applications in the study of atmospheric physics. Marcus and his students have set up a cavity ringdown spectroscopy lab from the ground up. Marcus supervises many students on undergraduate research projects, many of whom are funded by the New York Space Grant Association grant from NASA. Marcus is a knowledgeable, rigorous, and responsive teacher who teaches a wide variety of courses in the department and is well-liked by his students.



Anne Pellerin joined our department in 2013. Dr. Pellerin received her Ph.D. from Université Laval in Canada in 2010. Pellerin came to Geneseo from Mount Allison University in New Brunswick Canada, where she was a visiting assistant professor. Prior to that, Pellerin was a postdoctoral research associate at Texas A&M University and also a research associate at the Space Telescope Science Institute and Johns Hopkins University. With expertise in the study of young stellar populations, Pellerin brings a wealth of expertise to the department. She is currently project leader of the Legacy ExtraGalactic UV Survey (LEGUS) collaboration which uses the Hubble Space Telescope to obtain UV images of 50 nearby galaxies (closer than about 11 Mpc).

Paul Baker is our newest Visiting Assistant Professor here at SUNY Geneseo, joining the department in 2013. Dr. Baker earned his Ph.D. at Montana State University in Bozeman, MT in 2013. Baker has research interests in numerical and statistical astrophysics, Bayesian statistical methods, and gravitational wave data analysis. Baker participates in the Laser Interferometer Gravitational Wave Observatory (LIGO) collaboration, which is a large-scale project funded by the National Science Foundation (NSF) which is attempting to directly detect gravitational waves.



Senior Instructional Support Specialist **Clint Cross** provides outstanding service to the department in numerous ways. In 1998, Cross came to Geneseo from the Laboratory of Laser Energetics where he was an experimental operations technician. With vast experience in accelerator operation from serving for many years as crew chief at the 15 MV Van de Graaff accelerator at the University of Rochester, Cross is an invaluable resource in the operation of our Pelletron accelerator. Cross also supervises the department's machine and instrument shop, where he assists faculty and students in the design and fabrication of numerous parts used in research projects. In 2005, Cross was recognized for his outstanding service to the College by receiving the Geneseo "Pride" award.

Department Secretary **Casey Bickle** provides superb leadership in the day-to-day operation of the department. Bickle brings a wealth of experience to her position, having served in numerous capacities at the College since 1983. In 2004, Bickle came to the physics department from the Provost's office where she held the title of Secretary 1. Previously, Bickle served for many years in the Milne library. Bickle has vast knowledge of many facets of College operation, and has an outstanding understanding of the budget and procurement process for SUNY, as well as a deep grasp of our program requirements. Bickle's energetic and cheerful demeanor makes her extremely well-liked by the many students, faculty, and staff that she interacts with on a daily basis.



Distinguished Emeritus Professor of Computational Astrophysics, **Dave Meisel** officially “retired” from SUNY Geneseo in 2005 but continues to contribute to the department in numerous ways. Meisel holds a Ph.D. in physics from The Ohio State University and joined the department in 1970. In 2001, Meisel was promoted to the Distinguished Professor rank, the highest in the SUNY system. Even in retirement, Meisel remains an active researcher who energetically involves undergraduates in his research projects and teaches classes for the department. With wide ranging expertise in a variety of fields, Meisel is a world-renowned expert in the study of micrometeors and is currently writing a textbook on astrophysics. Meisel has won numerous awards and citations for his groundbreaking research and provides valuable mentoring to junior faculty members in the department.