

# Southern Methodist University

## Graduate Study in Physics

The Department of Physics in SMU's Dedman College of Humanities and Sciences offers one of the country's leading programs of graduate study in experimental and theoretical particle physics. The experimental program engages in particle accelerator based studies aimed at searches for fundamentally new phenomena. Our theorist faculty members have diverse interests ranging from the phenomenological interpretation of experimental results to mathematical physics.

### GRADUATE PROGRAMS

The Department of Physics offers Master of Science and Doctor of Philosophy degree programs. These programs provide excellent preparation to students for careers in research, teaching and industry, and our graduate students have moved on to distinguished positions in both academia and industry.

**Master of Science (M.S.):** This program takes approximately two years to complete and is designed primarily for students intending to pursue industrial or teaching careers for which the graduate course is required but the additional 3 years of PhD research are not. The degree plan includes completion of 30 semester hours of course work, including at least 18 hours earned in graduate level courses. Either a degree thesis on a research topic, or an additional 3 semester hours, are required for the M.S. degree.

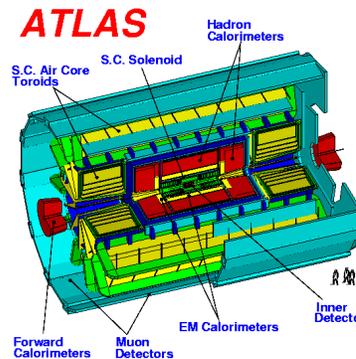
**Doctor of Philosophy (Ph.D.):** This program includes academic and research training that may be completed in approximately five years. The general course work required is the same as for the Master's program. After passing a Qualifying Examination students devote the major part of their effort to research and the preparation of their dissertation. Experimental students may have the opportunity to reside for extended periods of time at the experiment site.

The experimental particle physics program involves participation in highly collaborative projects that include physicists from many universities and laboratories worldwide. Current projects include:

#### ATLAS at LHC

This is a very large experiment under construction at what will be the world's most powerful particle accelerator located at the CERN Laboratory for Particle Physics near Geneva, Switzerland. The collaboration of about 1500 physicists from about 150 universities and 35 countries will search for the elusive Higgs particle thought to be responsible for the mass of the known

fundamental constituents of matter. The ATLAS detector has been under construction since 1997 and will start its operations in 2007. The SMU group is working on energy measurements in ATLAS using calorimetry.



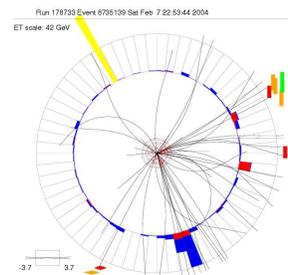
Students will have the opportunity to work with this state-of-the-art device. Our physics goals include searches for new phenomena: the Higgs boson responsible for particle masses, supersymmetry, extra dimensions, magnetic monopoles and others. In addition, the SMU group is pursuing an aggressive R&D program for the detector upgrade to develop very fast electronics components that can work in a very high radiation environment.

#### NOvA

There is compelling evidence that neutrinos change flavor, implying that neutrinos are massive and that leptons mix. SMU, under the direction of Coan, is a member of the international NOvA collaboration that proposes to study the oscillation of muon neutrinos produced at Fermilab into electron neutrinos detected by a massive 25-kiloton detector in northern Minnesota. Key experimental goals of this second generation neutrino experiment are establishing the "mass hierarchy" of the neutrino mass eigenstates, measuring the electron component in the singlet mass eigenstate, and detecting CP violation in the neutrino sector. Coan is currently developing novel instrumentation for quality assurance of the NOvA's 18.5 kilotons of liquid scintillator.

#### DØ at the Fermilab Tevatron

Quarks lie at the fundamental stratum of nature's constituents. The most recently discovered quark, the top quark, has some of the most mysterious properties of this particle family. Its large mass makes it a crucial probe of the yet undiscovered Higgs boson in particle physics and the generation of mass in general. SMU is involved in the DØ experiment at Fermilab. A primary purpose of this experiment is the measurement of the top quark's



properties, and SMU is strongly involved in the measurement of the top mass.

Students selected for the experimental program will take part in all aspects of the experimental work: preparation and/or construction of the detector, simulation and data reconstruction software development, data taking, and data analysis.

The theoretical particle physics research opportunities follow the interests and current projects of the faculty. These include theoretical and phenomenological studies of the strong, electromagnetic and weak interactions, including the Standard Model and its extensions, supersymmetry, quantum chromodynamics (QCD), and the Parton Model.

Field Theory studies focus on nonperturbative aspects such as bound systems and confinement in quantum chromodynamics, with an emphasis on light-cone quantization and lattice gauge theory.

### ADMISSION/FINANCIAL AID

Applicants must meet the minimum requirements set by the Office of Research and Graduate Studies. These are based on the Graduate Record Examination (GRE) scores including subject (physics) results. Applicants for whom English is not the first language must also take the Test of English as a Foreign Language (TOEFL) and score a minimum of 550.

SMU offers a substantial award package to qualified students. Teaching and Research Assistantships are available to students in good standing and are given primarily to students who pursue Ph.D. degrees. The graduate stipend for 2006/2007 is \$19,888/year before the qualifier. It is \$21,080/year after the qualifying exam. For exceptional candidates, the department will also award up to two Lightner-Sams fellowships that carry an additional \$7000/year. In addition, the department covers student health insurance and all graduate tuition and fees are waived.

Detailed information about the Physics Dept., research and graduate program, including application forms etc, can be found at web site: <http://www.physics.smu.edu>

### FACULTY MEMBERS

**Marc P. Christensen**, Assistant Research Professor,  
Joint-Appointment with SMU EE Department.

**Thomas E. Coan**, Associate Professor, Ph.D.,  
University of California at Berkeley, 1989.

**John Cotton**, Adjunct Professor.

**Simon Dalley**, Visiting Assistant Professor, Ph.D.  
University of Southampton, 1991.

**Gary A. Evans**, Research Professor,  
Joint-Appointment with SMU EE Department.

**Yongsheng Gao**, Assistant Professor, Ph.D., University  
of Wisconsin-Madison, 1995.

**Peggy Ping Gui**, Assistant Research Professor,  
Joint-Appointment with SMU EE Department.

**Kent Hornbostel**, Associate Professor, Ph.D.,  
Stanford University, 1988.

**Robert Kehoe**, Assistant Professor, Ph.D.,  
University of Notre Dame. 1997.

**Gary D. McCartor**, Professor, Ph.D.,  
Texas A&M University, 1969.

**Cas Milner**, Adjunct Professor, Ph.D.,  
University of Texas at Austin, 1985.

**Fredrick I. Olness**, Associate Professor, Ph.D.,  
University of Wisconsin-Madison, 1985.

**Shane Palmer**, Adjunct Professor.

**Randall J. Scalise**, Senior Lecturer, Ph.D.,  
Pennsylvania State University, 1994.

**Ryszard A. Stroynowski**, Professor, Ph.D.,  
University of Geneva, 1973.

**Vigdor L. Teplitz**, Professor, Ph.D.,  
University of Maryland.

**Roberto Vega**, Associate Professor, Ph.D.,  
University of Texas at Austin, 1988.

**Byron Williams**, Adjunct Professor.

**Jingbo Ye**, Assistant Professor, Ph.D.  
University of Science and Technology of China.