

Physics

*Master of Arts
Doctor of Philosophy*

For More Information

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Facilities for Graduate Work

Modern facilities for graduate study and research include a large-scale cryogenic laboratory; extensive facilities for tunneling and force microscopy and nanostructure characterization, SQUID magnetometry, and electron spectroscopy; well-equipped laboratories in optical spectroscopy, quantum optics, femtosecond spectroscopy and diagnostics, and surface scattering; and facilities including two table-top 100-terawatt lasers for strong-field physics, studies of wakefield electron acceleration, and a pulsed 50T magnetic field for studies of laser heating of magnetized plasmas, and two petawatt lasers (one Ti-sapphire providing 30J in 30fs and another glass laser at 200J in 150fs). The department is a member of LASER NET, a DOE supported consortium of laser laboratories for high energy density plasma physics. The Center for Gravitational Physics conducts research in conjunction with several Gravitational Wave Observatories (ground-based US LIGO, Italian/French Virgo, Japanese Kagra, and the space-based ESA/NASA mission LISA). Plasma physics experiments are conducted at the major national tokamaks in Boston and San Diego. Experiments in high-energy heavy ion nuclear and particle physics are conducted at large accelerator facilities such as the large hadron collider and ALICE at CERN, the STAR detector on the RHIC collider at Brookhaven National Lab, neutrino production at FERMI National Laboratory (Illinois), and Germany's Deutsches Electron Synchrotron.

Theoretical work in plasma physics, condensed matter physics, acoustics, nonlinear dynamics, relativity, astrophysics, statistical mechanics, and particle theory is conducted within the Department of Physics.

Students have access to excellent computer and library facilities, including computers at TACC: Ranger, a multiprocessor computer at 504 Tflops and Stampede which provides 3.5 Pflops in a computer cluster and 7+ Pflops of coprocessor support.

The department maintains and staffs a machine shop, student workshop, low-temperature and high-vacuum shop, and an electronics design and repair shop.

Areas of Study

The Department of Physics has active research groups in ten main areas of current physics research: atomic, molecular, and optical physics; classical physics; nuclear physics; statistical and thermal physics; fusion plasma physics and high energy density plasma physics; condensed matter physics; biophysics; nonlinear dynamics; gravitation and cosmology; and elementary particle physics. In most of these fields both experimental and theoretical work is in progress.

Graduate Studies Committee

The following faculty members served on the Graduate Studies Committee (GSC) in the spring 2023 semester.

Scott J Aaronson	John W Keto
Jose R Alvarado	Eslam Khalaf
Timothy R Andeen Jr	Can Kilic
Edoardo Baldini	Scott Kravitz
Kimberly Kay Boddy	Paul D Kunz
Boris Breizman	Pablo Laguna
Elena Caceres	Keji Lai
James R Chelikowsky	Sheldon Landsberger
Hsin-Yu Chen	Karol Lang
William R Coker	Xiaoqin Li
Alejandro L De Lozanne	Allan H Macdonald
Alexander A Demkov	Michael P Marder
Jacques Distler	Christina Markert
Todd Ditmire	John T Markert
Michael Wayne Downer	Richard A Matzner
Willy Fischler	Philip J Morrison
Richard Fitzpatrick	Peter Onyisi
Ernst-Ludwig Florin	Raymond Lee Orbach
Daniel S Freed	Sonia Paban
Katherine Freese	Mark G Raizen
Nicholas Galitzki	Linda E Reichl
Kenneth W Gentle	Jackie L Ritchie
William Gilpin	Paul R Shapiro
Feliciano Giustino	Chih-Kang Shih
John B Goodenough	Deirdre Shoemaker
Vernita Gordon	Greg O Sitz
Richard D Hazeltine	Anna Tenerani
Bjorn Hegelich	Devarajan Thirumalai
Daniel J Heinzen	Maxim Tsoi
Nick Hunter-Jones	Emanuel Tutuc
Vadim Kaplunovsky	Zhen Yao
Andreas Karch	Aaron Zimmerman