

Accelerators form the backbone of SLAC's experimental programs. They are sophisticated instruments that require advanced physics and engineering innovations to achieve the ever-increasing level of performance that enables and leads the way for the discoveries in the experimental programs. SLAC is a world-leading institute in accelerator physics and technology.

The Accelerator Directorate (AD) is the organization charged with performing the needed research. The Accelerator Research Division (ARD) within AD has a world renowned research program in advanced acceleration techniques and is engaged in R&D on some of the most advanced accelerators in the world including the Large Hadron Collider at CERN and SLAC's own Linac Coherent Light Source (LCLS), the world's first x-ray laser.

SLAC test facilities dedicated to accelerator research include the Accelerator Structure Test Area (ASTA), the NLC Test Accelerator (NLCTA) and the Echo-7 experiment, dedicated to the study of FEL and seeding techniques.

The soon to be commissioned Facility for Advanced Accelerator Test (FACET) will be the world's highest energy electron accelerator test facility and among its many uses will be a test of "plasma wakefield" acceleration which holds the promise of greatly increased acceleration gradients.

Finally, the proposed End Station Test Beam (ESTB) offers many more opportunities for detector and linear collider instrumentation R&D.

Graduate fellowships are offered to Stanford students in Physics, Applied Physics, Chemistry, and Materials Science Engineering. Want to know more?

- Look inside...
- Contact Faculty/Staff directly
- ARD web-site for detailed information https://slacportal.slac.stanford.edu/sites/ard_public/
- Applied Physics web-site / Lasers & Accelerators <http://www.stanford.edu/dept/app-physics/cqi-bin/>

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Chair of ARD Education Committee:

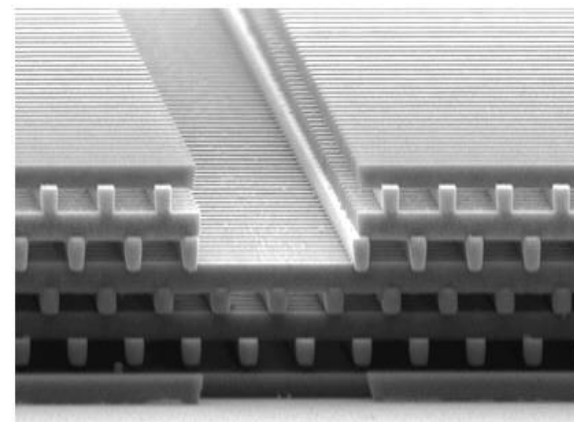
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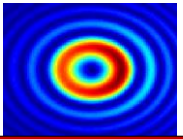
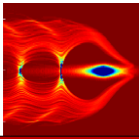
ACCELERATOR RESEARCH AT THE SLAC NATIONAL ACCELERATOR LABORATORY



Graduate research opportunities in Accelerator Research

General inquiries: please contact

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Research Areas

The SLAC accelerator research program is broad in scope, ranging from fundamental beam physics theory to technology development. There are active programs in:

THEORY

FEL theory, seeding and beam manipulation concepts; **Contacts: Zhirong Huang, John Galayda**

Beam theory and nonlinear dynamics; **Contacts: Ron Ruth, Yunhai Cai**

Massively parallel computation techniques for accelerator physics; **Contact: Cho Ng**

Use of new concepts to design and optimize novel accelerator facilities; **Contact: Tor Raubenheimer**

Nonlinear particle beam dynamics and collective effects; **Contact: Alex Chao**

Storage Ring Dynamics and Novel Diagnostics; **Contacts: James Safranek, Jeff Corbett**

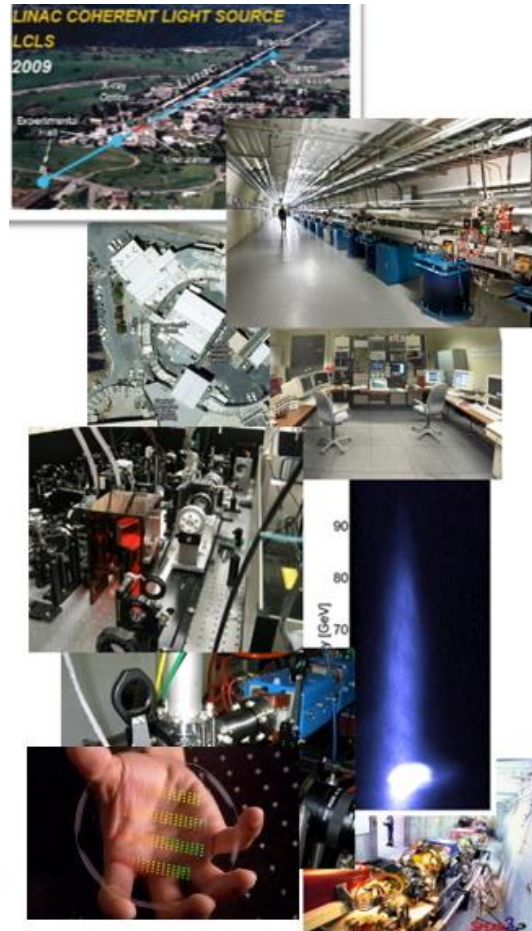
High gradient microwave acceleration; **Contact: Sami Tantawi**

SLAC Students Dominate American Physical Society Outstanding Doctoral Thesis Research in Beam Physics Awards. Past SLAC winners:

Daniel Ratner, a student of Alex Chao (2012)
Ian Blumenfeld, a student of Bob Siemann (2011)
Dmitry Teytelman, a student of John Fox (2004)
David Pritzkau, a student of Bob Siemann (2003)
Boris Podobedov, a student of Bob Siemann (2002)
Shyam Prabhakar, a student of John Fox (2001)

Doctoral research in the Accelerator Research Division takes place in a stimulating environment with strong national and international collaboration.

Most research groups are small, averaging less than 10 people. Students have the opportunity to engage in all aspects of a group's program, or focus on just one and frequently they can develop their ideas from concept and theory, through detailed simulation to leading the experimental investigation.



EXPERIMENT

Instability dynamics, control techniques and high speed signal processing for high intensity beams; **Contact: John Fox**

Test Facilities experimental program; **Contacts: Carsten Hast**

FEL experiments and novel laser-electron interactions for radiation generation; **Contacts: Zhirong Huang, John Galayda, Joe Frisch**

Laser acceleration using nanofabricated photonic microstructures in dielectric materials. **Contacts: Joel England**

Plasma acceleration where electric fields in plasmas are used to generate acceleration fields of many GV/m; **Contact: Mark Hogan**

Recent Graduate Thesis Work at SLAC

Christopher McGuinness "*Particle Accelerator on a Chip: Fabrication and Characterization of a 3D Photonic Crystal Accelerator*" Advisor: Bob Byer, 2012, Current position: Postdoc, Radiation Oncology, UCSF

Daniel Ratner "*Much Ado About Microbunching: Coherent Bunching in High Brightness Electron Beams*" Advisor: Alex Chao, 2011, Current Position: Staff Scientist, SLAC

Themistoklis Mastoridis "*Radio Frequency Station - Beam Dynamics Interaction in Circular Accelerators*" Advisors John Fox and Sami Tantawi, 2010, Current Position: Toohig Fellow, CERN and SLAC

Ian Blumenfeld, "*Scaling of the Longitudinal Electric Fields and Transformer Ratio in a Non-Linear Plasma Wakefield Accelerator*," Advisor: Alex Chao, 2009, Current position: Scientist, Archimedes Inc.

Neil Kirby, "*Properties of Trapped Electron Bunches in a Plasma Wakefield Accelerator*," Advisor: Alex Chao, 2009, Current position: Clinical Instructor, UCSF.