Joint University-Fermilab Doctoral Program in Accelerator Physics

- Established in 1985

- Program works in a joint agreement with universities.
  - Fermilab provides the research facilities and mentors
  - Students maintain relationships with their home institution's advisers
The Process:

- Student completes all of the university course requirements and prelim. exams
- A professor at the university acts as advisor
- Fermilab staff member acts as mentor
- PhD awarded by the university

- Fermilab PhD Committee approves application, and thesis topic.

- The Committee periodically reviews progress, approves continuation of the student in the program.

- Fermilab reimburses the university for the student's salary, and also provides an additional housing allowance.
Fermilab Accelerator PhD program

Graduates:

Vadim Kashikhin (SRIEA, Russia) 2002 sc magnets
Vincent Wu (Cincinnati) 2001 rf cavities/muCool
Jean-Paul Carneiro (U. of Paris) 2000 photoinjector
O. Krivosheev (TPU, Russia) 1998 energy deposition
K. Langen (Wisconsin) 1997
E. Colby (UCLA) 1997
L. Spentzouris (Northwestern) 1996
D. Olivieri (Massachusetts) 1996
P. Chou (Northwestern) 1995
D. Siergiej (New Mexico) 1995
X. Lu (Colorado) 1994
W. Graves (Wisconsin) 1994
K. Harkay (Purdue) 1993
P. Zhou (Northwestern) 1993
T. Satogata (Northwestern) 1993
J. Palkovic (Wisconsin) 1991
X. Wang (IIT) 1991
P. Zhang (Houston) 1991
S. Stahl (Northwestern) 1991
L. Sagalofsky (Illinois) 1989
L. Merminga (Michigan) 1989
M. Syphers (Illinois - Chicago) 1987
Fermilab Accelerator PhD program

Present Students:

Kip Bishofberger
(Vladimir Shiltsev) (UCLA, J. Rosenzweig) Tevatron tune-shift compensation.

Sergei Seletskiy
(Segei Nagaitsev) (Rochester, Adrian Melissinos) Recycler electron cooling.

Linda Imbasciati
(Pierre Bauer) (TU-Vienna, H. Kirchmayr) Quench process in VLHC magnets.

Ludovic Nicolas
(Nikolai Mokhov) (Glasgow, P. Bussey) Small angle effects in the Tevatron.

Mohammad Alsharoa
(Al Moretti) (IIT, M. Gosz) High gradient rf cavities for muon collider and neutrino factory

Phil Yoon
(Tanaji Sen/Mike Syphers) (Rochester, Arie Bodek) Beam stability studies in the Tevatron.

Xiaobiao Huang
(Eric Prebys) (Indiana, SY Lee) Booster studies for higher intensity

Pavel Snopok
(David Neuffer/Carel Johnstone) (Michigan State, Martin Berz) Capture of a large phase space beam

Alexey Poklonsky
(Carl Johnstone/Valeri Lebedev) (Michigan State, Martin Berz) Optimization and control of Tevatron parameters.

Bernardo Bordini
(Emmanuela Barzi) (Pisa) Nb3Sn cable. NOT YET STARTED

M. Syphers /
FNAL Accelerator PhD program
Other (non-program) Graduate Students…

Present Students with research at Photoinjector:

Yin-e Sun, Chicago, flat beam
Shauheng Wang, Indiana, flat beam
Rodion Tikhoplav, Rochester, laser acceleration
Matt Thompson, UCLA, plasma electron trapping
Dan Bollinger, NIU, plasma acceleration

Relatively recent (since 1997) dissertations from Photoinjector:

Eric Colby (UCLA)*
Alan Fry (Rochester)
Michael Fitch (Rochester)
Sven Fritzler (Darmstadt)
Jean-Paul Carneiro (Paris)*
Nick Barov (UCLA)

*participants in FNAL PhD Program

Present Student with research in Cryogenics:

Christine Darve (Northwestern)
The Russian Connection…

Early summer 2001, Victor Yarba proposed seeking Russian graduate students to participate in FNAL PhD program.

By August 2001, Witherell agreed to donate funds for 5 more positions, with ICAR playing a leading role in the search. Efforts coordinated by Linda Spentzouris.

Universities participating:
- Chicago, IIT, NIU, Northwestern,
- Illinois, MSU, UCLA, Cornell

Spring 2002, team assembled and sent to Russia --
- Kwang-Je Kim
- Jaime Rosensweig
- Hasan Padamsee
- Victor Yarba

February 2003:
- Pavel Snopok and Alexey Poklonsky from St. Petersburg accepted into program, as students from MSU
Joint University-Fermilab Doctoral Program in Accelerator Physics

Degree Program Trains Accelerator Physicists at the World’s Highest-Energy Particle Accelerator.

The Joint University-Fermilab PhD Program is designed to train high-energy physicists for work in areas of interest to both Fermilab and University departments. The program is designed to prepare students for careers in industry, government, and academia.

The University-Fermilab PhD Program offers unique opportunities for research leading to a PhD degree.

Some of the current research areas include:

- **Neutrino Physics**
  - Neutrino Physics
  - Neutrino Astrophysics
  - Neutrino Oscillations
  - Neutrino Interactions

- **Cosmology**
  - Cosmology: Early Universe
  - Cosmology: Dark Matter
  - Cosmology: Large-Scale Structure

- **Particle Physics**
  - Particle Physics: Standard Model
  - Particle Physics: Beyond the Standard Model

- **Accelerator Physics**
  - Accelerator Physics: Linear and Circular Accelerators
  - Accelerator Physics: Beams and Beams Physics
  - Accelerator Physics: Detectors and Calorimetry

- **Computational Physics**
  - Computational Physics: Numerical Methods
  - Computational Physics: Data Analysis

A graduate student at a university, interested in pursuing a degree in accelerator physics, who has completed all of the university course requirements, may do doctoral research at Fermilab. A professor at the university acts as the university advisor, and the student carries out research at Fermilab with a Fermilab staff member as the primary advisor.

The Fermilab Accelerator PhD Committee reviews the applications of interested students. The committee is composed of the faculty members of the program. Fermilab enforces the university’s admissions policies and also provides additional housing allowances.

The Fermilab/NICADD Photon injector Laboratory

The Fermilab/NICADD Photon Injector Laboratory supports the development of the photoinjector that presently delivers beams to the superconducting linear accelerator at Fermilab. The laboratory is responsible for commissioning and operation of the photoinjector and for all aspects of the complex, including beam transport, detector systems, and computing systems. The laboratory is also responsible for providing support for the Fermilab Accelerator Facility (FAF) and for the Fermilab Accelerator Physics Program.

Other important aspects of research in the Fermilab/NICADD Photon Injector Laboratory include:

- **Beam dynamics and transport**
  - Beam dynamics and transport
  - Beam stability and control
  - Beam monitoring and feedback

- **Detector systems**
  - Detector systems
  - Detector calibration and testing
  - Detector data acquisition and analysis

- **Computational tools**
  - Computational tools
  - Computational software development

Fermilab/NICADD Photon Injector Laboratory

Last updated May 14, 2020 - MJS
Budker Seminar Series
in Accelerator Physics

Initiated in 1990’s, later “named” by V. Shiltsev; since, coordinated by S. Nagaitsev, now P. Bauer.

Student “pizza and beer” seminars for monitoring progress, posing questions, and practicing presentations…

G. I. Budker 1918-1977

Day: Last Tuesday of the month (typically, but not always!)

Time: 6:00 p.m.

Place: Music Room, Fermilab Users Center, Fermilab Village

Coordinator: Pierre Bauer, x5409, pbauer@fnal.gov
United States Particle Accelerator School
Fermilab Instructors
Summer 1988 - Summer 2003

(ug) -- denotes undergraduate credit course; otherwise, all courses for graduate credit.

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Total Credit Hours</th>
<th>Course Titles</th>
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<tbody>
<tr>
<td>Carey, David</td>
<td>3</td>
<td>Introduction to Accelerator Optics (ug)</td>
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<tr>
<td>Cossairt, J. Donald</td>
<td>9</td>
<td>Topics in Radiation Damage</td>
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<td>Radiation Physics at Accelerators</td>
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<td></td>
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<td>Radiation Physics, Regulation, and Management</td>
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<td>Edwards, Donald</td>
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<td>Introduction to Accelerator Physics</td>
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<tr>
<td>Glass, Henry</td>
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<td>Magnetic Measurements</td>
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<tr>
<td>Holmes, Stephen</td>
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<td>Experimental Methods in Accelerator Physics</td>
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<td>An Introduction to Particle Accelerators</td>
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<td>Jackson, Gerald</td>
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<td>Experimental Methods in Accelerator Physics</td>
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<td>Accelerator Instr. &amp; Beam Measurement Lab</td>
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<td></td>
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<td>Accelerator Vacuum Laboratory</td>
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<tr>
<td>Carol Johnstone</td>
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<td>Accelerator Fundamentals (ug)</td>
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<tr>
<td>McGinnis, David</td>
<td>6</td>
<td>Introduction to RF Systems</td>
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<td>Microwave Measurement and Beam Physics Lab</td>
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<td>Introduction to Modern Dynamics</td>
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<tr>
<td>Ng, K.Y.</td>
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<td>Physics of Collective beam Instabilities</td>
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<td>Ostiguy, Francois</td>
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<td>Computer Lab for Accel Phys and Tech courses</td>
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<td>Pasquinelli, Ralph</td>
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<td>Spentzouris, Linda</td>
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<td>Plasma Physics in Beams</td>
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<tr>
<td>Webber, Robert</td>
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<td>Introduction to RF Systems</td>
</tr>
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</table>

16 instructors, 123 credit hours, ~16 topics

List does not include semester courses taught at non-USPAS universities.

M. Syphers /
FNAL Accelerator PhD program