



25th Annual Accelerator Test Facility (ATF) Users' Meeting AE63 "Stony Brook Accelerator Laboratory Course"

Presenter: Mikhail Fedurin

Dmitriy Kayran, Vladimir Litvinenko (PI)

Brookhaven National Laboratory and Stony Brook University

02/28/2023



CASE course: PHY542 “Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab”

Instructors affiliated at Stony Brook University and Brookhaven National Laboratory:

Mikhail Fedurin (2014-present)

Dmitry Kayran (2014-present)

Diktys Stratakis (2014-2016)

CASE at SBU, Ernest Courant Traineeship

CASE – The Center for Accelerator Science and Education has been established established as a Type I Institute within the University on November 19, 2008 as a Joint venture of BNL and SBU,

- To train scientists and engineers with the aim of advancing the field of accelerator science;
- To develop a unique program of educational outreach that will provide broad access to a research accelerator; and,
- To attract Federal and industrial funding for an expanding interdisciplinary research and education program that utilizes accelerators.

[The Stony Brook University / BNL connection](#) provides an ideal educational environment. The close proximity to BNL and the BSA connection provides for a superb combination of both university and national laboratory environment.

http://case.physics.stonybrook.edu/index.php/Main_Page



Award Letter Received

Grant ID:	FP00002274
PI Name:	Vladimir Litvinenko
Title:	Ernest Courant Traineeship in Accelerator Science and Technology
Sponsor:	US Department of Energy

We would like to inform you that our office has received your award notice referenced below which is being forwarded for processing to your Grants or Contracts Specialist in the Office of Sponsored Programs.

\$2.9M over 5 years

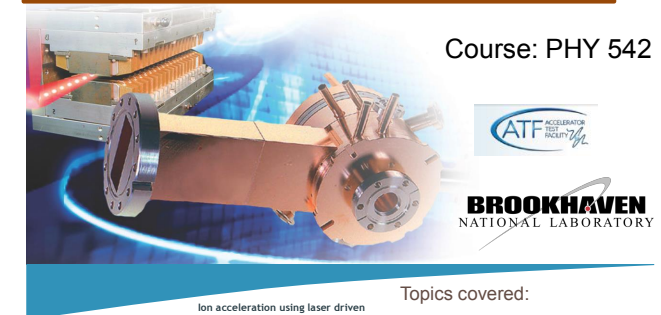
Collaboration of BNL, FNL, Cornell and Stony Brook Universities

Course goals

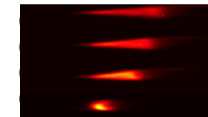
- Introduce students to the field of experimental Accelerator Physics
- Demonstrate e-beam techniques and diagnostics used in Advanced Accelerator Concept experiments at Accelerator Test Facility
- Teach students to model experiments, compare model results with measurements.

http://case.physics.stonybrook.edu/index.php/PHY542_spring_2022

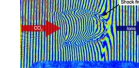
Advanced Accelerator Laboratory at Accelerator Test Facility (ATF), BNL, Spring 2015



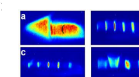
Experimental Demonstration of a Tunable De-chirper



Ion acceleration using laser driven shocks



Beam Manipulation by Self-Wakefield



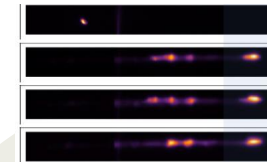
Topics covered:

- Design of accelerators and theoretical models
- Beam diagnostics
- Computational techniques
- High-brightness sources
- Novel ways of acceleration

"The ATF is a perfect place to learn how to deal with 21st century accelerators. You would have hands-on experience with modern accelerators and will learn how to tune and operate it"



3 Credits!
Register Now!



Contact Information:

Prof. Mikhail Fedurin (fedurin@bnl.gov), Prof. Dmitry Kayran (dkayran@bnl.gov), Prof. Diktys Stratakis (dikty@bnl.gov)
Brookhaven National Laboratory
<http://www.bnl.gov/atf/>

Syllabus (plan for spring 2022)

- Course overview, administrative issues
- Introduction to photo-injectors
- Modeling photo-injectors
- Transport of particle beams, Beam Acceleration
- Beam Diagnostics, emittance measurement techniques
- Dispersion and Masking Techniques
- Tour at RHIC CeCEX (Coherent electron Cooler Experiment), LEReC (Low Energy RHIC electron Cooler) beamlines
- Coherent Synchrotron Radiation (CSR). Experimental demonstration of CSR; magnetic bunch compression
- Measurements for project report and presentation

PHY542 web page (example):

http://case.physics.stonybrook.edu/index.php/PHY542_spring_2022

Evaluation (plan for spring 2022)

- ✓ Student's performance was evaluated based on:
 - ✓ active involvement in the laboratory (25% of final grade);
 - ✓ lab report (60% of final grade);
 - ✓ presentation of a project topic (20% of final grade).

- ✓ Students did prepare Report and one Presentation during semester
 - ✓ Report and Presentation from one of lab class (see syllabus)
 - ✓ Content should include: 1) theory of the experiment and explain the objectives; 2) technique used to obtain data; 3) detailed data analysis; 4) conclusion remarks

- ✓ Presentation was made at the end of semester. Required better preparation. Presentation was performed at front of the class. To avoid the overlap topics was distributed at beginning of semester among students

PHY542 web page (example):

http://case.physics.stonybrook.edu/index.php/PHY542_spring_2022

Extended class for City University New York

In Spring and Fall of 2022 AE63 was extended to give introductory Accelerator Laboratory course for CUNY students

AE63 extension was supported by BNL diversity program:

- 8 hours presentations dedicated accelerator and laser physics by M.Fedurin and M.Polyansky
- Students visit AAC22 conference with tour at facility



CUNY
2019



CUNY 2022 Spring
(Lecture about Lasers)
on ZOOM

CUNY 2022 Fall
(Lecture about
accelerators)
on ZOOM

Romario 4:55 PM

Thank you!

Brian Park 4:55 PM

Thank you! It was great presentation

Leonel Platero 4:55 PM

thank you!

Biswajit ramsingh 4:55 PM

thank you

Zu Qiang Deng 4:55 PM

Thank You!!!

Ralph Castro 4:55 PM

Thank you for your time

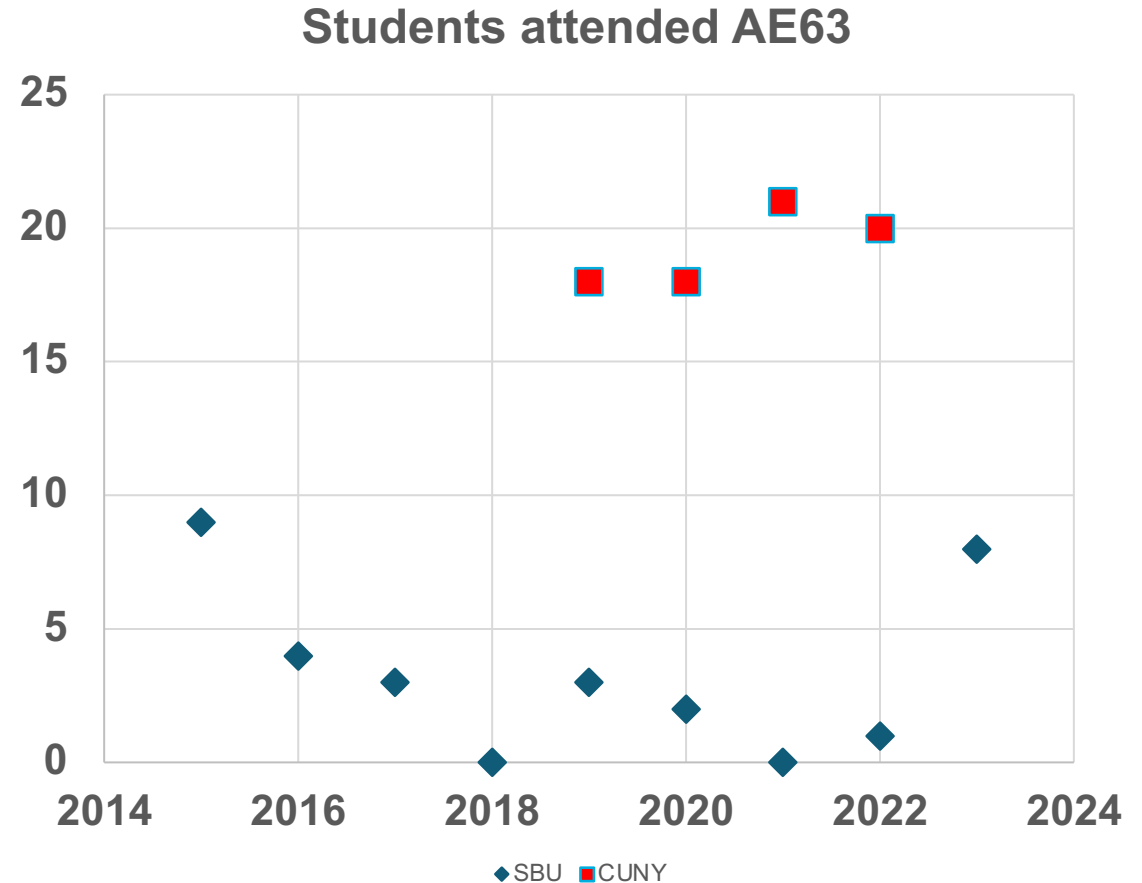
Jordan Miller 4:55 PM

Thank you cant wait for the tour and next week 😊

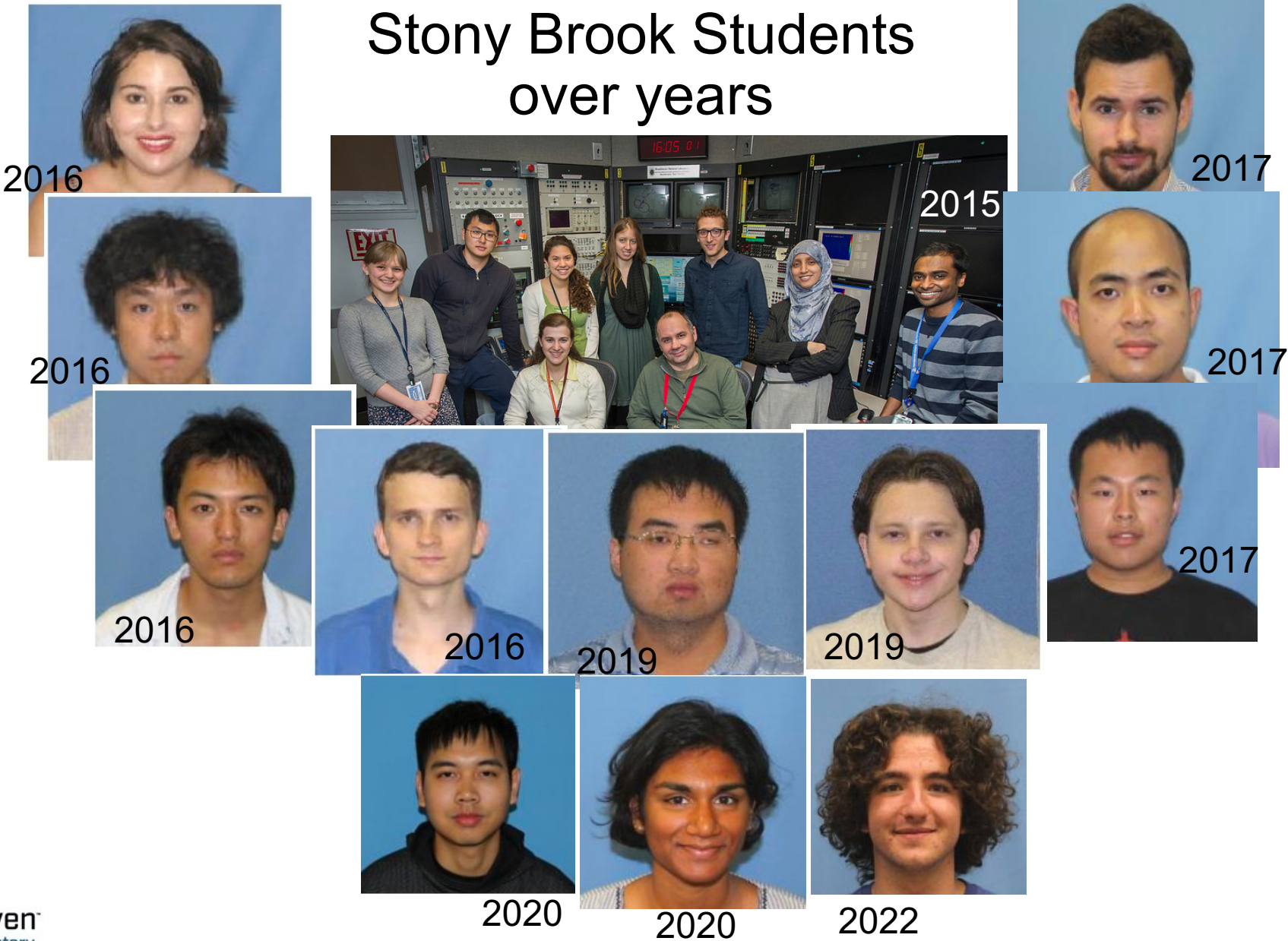
Carolina Morano 4:55 PM

AE63 - PHY542 facts

- 21 SBU students were attended and evaluated in PHY542 since 2015
- Two of SBU students received PhD in Accelerator Science field
- 77 CUNY students were attended AE63 lectures since 2019



Stony Brook Students over years



Questions?