



Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

Workforce Development Programs: CCI and SULI

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Fermilab

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Fermilab

Fermilab is American's particle physics and accelerator laboratory

What we do:

- Particle physics
- Particle accelerator
- Detectors
- Computing
- Quantum science and technology
- Emerging technologies
- Theoretical physics

Fermilab science programs are performed by people from different STEM careers including: Physics, math, computer science, electrical engineering, mechanical engineering, electronics ...

This talk covers CCI and SULI internship programs at Fermilab

Community College Internships (CCI)

- CCI program seeks to encourage community college to enter technical careers by providing technical training experiences
 - Students work on technologies or instrumentation or major research facilities supporting laboratories's mission
 - Students work under the guidance of scientists or engineers
 - CCI provides community college students with 10-week summer training experience

Eligibility:

- Current, full-time community college enrollment
- Completion of at least 6 credit hours in science, mathematics, engineering, or technology course
- Overall completion of at least 12 credits hours
- 3.0 grade point average or above on a 4.0 scale
- At least 18 years of age
- U.S. citizenship or permanent resident status
- Proof of identity and eligibility to work in the United States
- *Students may participate in the CCI program twice and can apply to the CCI program a maximum of three times.*

Application Requirements:

- Online application
- Unofficial transcripts
- Two letters of recommendation

Internship Details:

- We offer Summer, Spring, and Fall terms
- Salary: \$650.00 per week; subject to change
- Housing: Housing arranged, and housing allowance will be provided for summer internships. **Housing will only be provided if the internship is held on-site.**
- Transportation: Paid round-trip airfare, or mileage reimbursement if permanent address is more than 50 miles from host laboratory.

Science Summer Undergraduate Laboratory Internship (SULI)

- SULI program encourages undergraduates students and recent graduate students to pursue science, technology, engineering and mathematic careers by providing research experiences at the Department of Energy laboratories
- Students perform research, under the guidance of laboratory scientist or engineers
- SULI places undergraduate physics or engineers majors in paid 10-week summer internships at Fermilab

Eligibility:

- Full-time undergraduate enrollment at an accredited institution *and* completion of at least one year as a matriculating undergraduate
- Undergraduate cumulative minimum GPA of 3.0 on a 4.0 scale
- 18 years of age
- U.S. citizen or lawful permanent resident
- High school diploma or certificate of General Education Development (GED)
- May participate in the SULI program twice and can apply to the SULI program a maximum of three times

Application Requirements:

- Online application
- Unofficial transcripts
- Two letters of recommendation

Internship Details:

- We offer Summer, Spring, and Fall terms
- Salary: \$650.00 per week; subject to change
- Housing: Housing allowance provided for summer internships. **Housing will only be provided if the internship is held on-site.**
- Transportation: Paid round-trip airfare, or mileage reimbursement if permanent address is more than 50 miles from host laboratory.

Required Deliverables

- SULI:
 - Entrance and exit surveys
 - Oral presentation
 - Research abstract
 - Research project summary
 - One-page peer review of another SULI intern's poster
- CCI:
 - Entrance and exit surveys
 - Project report paper.
 - Poster or presentation



SULI PROGRAM STUDENT OBLIGATIONS

The Science Undergraduate Laboratory Internship (SULI) program required deliverables are an important element of your internship experience, and are designed to help develop skills important for STEM career professionals.

Required Deliverables

There are four required deliverables:

1) **Oral or Poster Presentation:**

All participants are required to deliver either an oral or a poster presentation before an appropriate peer group. The subject matter for the presentation is to be based upon the participant's internship research project activities. Prior to the poster or oral presentation, submission of a short (150 word) abstract summarizing the presentation content, as well as all final content used in the presentation, is required. Some institutions may not offer an option for an oral presentation. In such cases, a poster presentation is required.

Application Process

- Application process includes:
 - Education background, including school, GPA, courses taken or in progress
 - Work experience and skills
 - First and second choice host laboratory
 - Two or three letters of recommendation
 - Essays:
 - Research experience
 - Research interest
 - Personal experience
 - Professional goals
- Only complete applications submitted by the deadline will be considered for evaluation and placement

Fermilab Selection Guidelines

- Fermilab receives many applications, internships are very competitive
- The candidates are evaluated using:
 - Overall GPA
 - GPA in STEM courses
 - Letter of recommendations
 - Essays
 - Background

SULI and CCI Internship Application and Program Dates

SULI Internship Term:	Spring 2025	Summer 2025	Fall 2024
On-line Application Opens	July 10, 2024	October 16, 2024	March 13, 2024
Applications including recommendations Due	October 2, 2024 5:00 PM ET	January 8, 2025 5:00 PM ET	May 22, 2024 5:00 PM ET
Offer Notification Period Begins on or around	October 17, 2024	February 5, 2025	June 5, 2024
All DOE Offers and Notifications Complete	On or around December 18, 2024	On or around April 16, 2025	On or around August 6, 2024

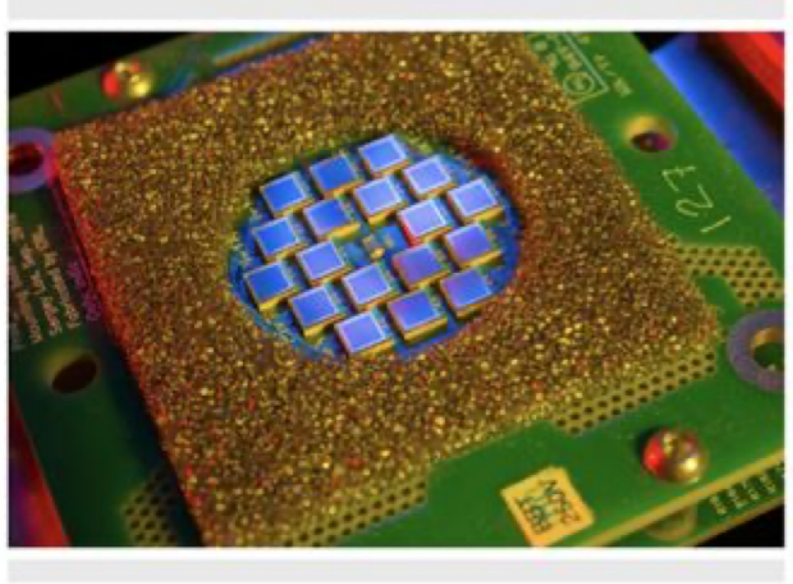
CCI Internship Term:	Spring 2025	Summer 2025	Fall 2024
On-line Application Opens	July 10, 2024	October 16, 2024	March 13, 2024
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Why Choose Fermilab?

- Experience in state-of-art and emerging technologies that are changing the world, in collaboration with top scientists and engineers
 - Companies require previous experience for entry level jobs
 - Graduate programs require previous experience and letters of reference
 - Make a new network, new connections with professors and post-docs from Universities
 - Summer work with a competitive salary while advancing your careers
 - Simultaneously earn, learn, contribute and enjoy the fun of pushing frontier of knowledge

Fermilab Science

Detectors, Computing and Quantum



Neutrino experiment

CMS Experiment



Mu2e will search for μ to e



Construction of the Mu2e detector



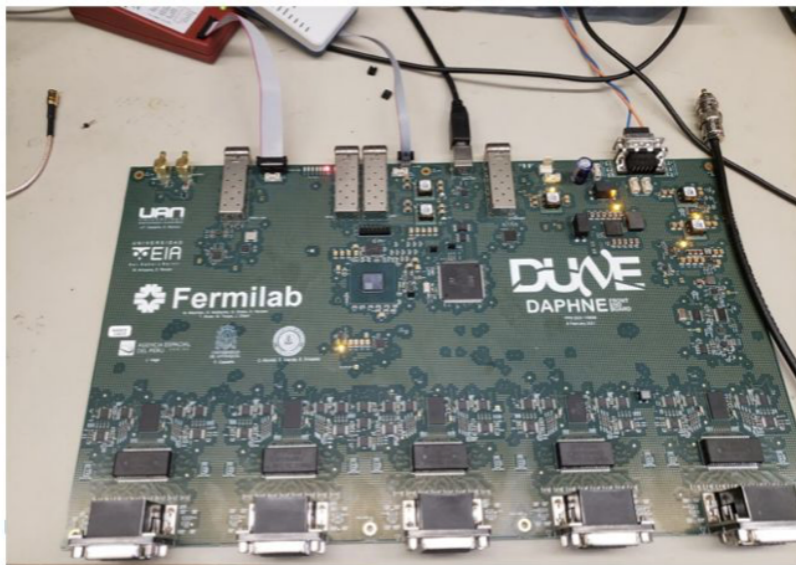
Dark Energy Search



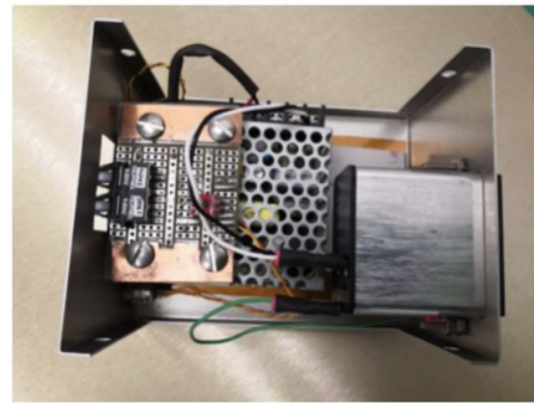
Examples of Testing and Building Electronics for Experiments

- Electrical engineers at Fermilab work on challenging projects to make detector electronics or tests key components of the experiments
 - Detector electronics: how to detect and readout particle hits, design and testing

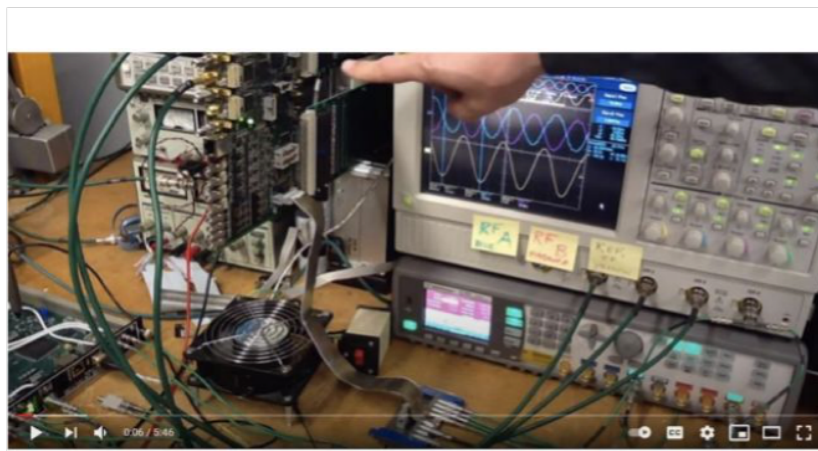
Detector electronics



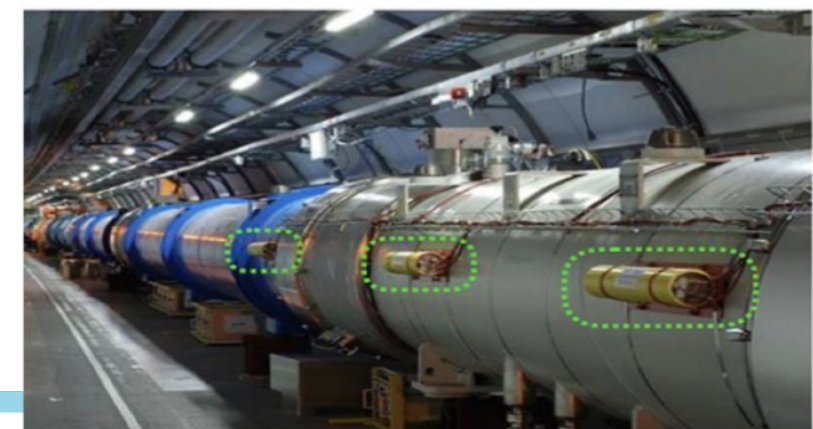
30kA power supply control and current distribution



Superconducting

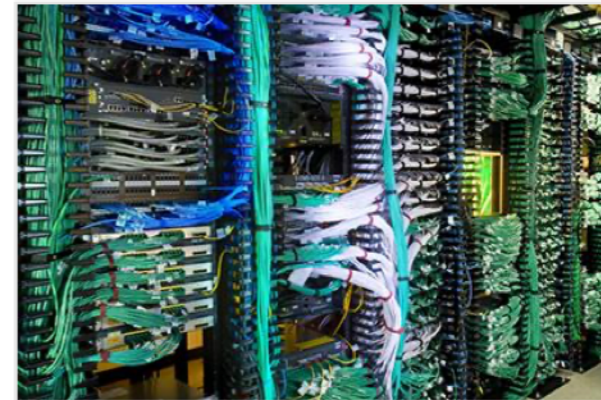


Beam Loss Monitoring System



Software and Computing

- Fermilab develops software to operate accelerators, detectors, and process physics data in modern computing systems
- Examples:
 - a. Data acquisition and controls
 - b. Cloud storage
 - c. Software to extract physics results
 - d. Data transport (networking)
 - e. Big data analysis
 - f. Artificial intelligence applications
 - g. Quantum computing for HEP



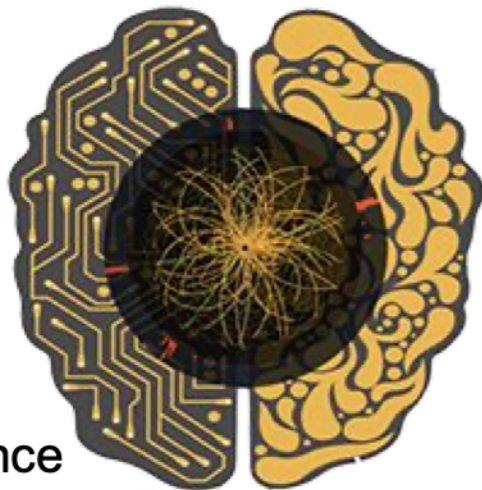
Networking



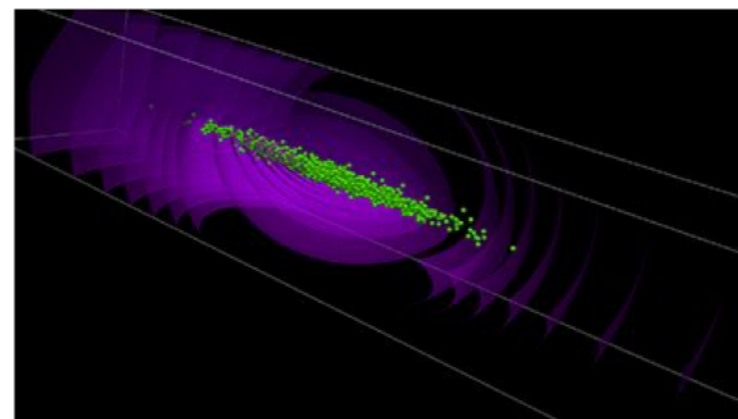
Cloud computing



R&D



Artificial
Intelligence



Accelerator beam simulation

Projects from SULI Interns

- Weak Gravitation Lensing of Low Surface Brightness Galaxies in the Dark Energy Survey Year 3 Catalog
- Counting Calories: Light Yield Studies for ADRIANO Calorimeter Prototype
- Light Dark Matter Experiment
- Neutron Calibration Studies for SuperCDMS SNOLAB Experiment
- Testing the Jump Finding Code for NEXUSQubit Analysis
- Simulation Based Interference with domain adaptation for strong gravitational lensing
- InfraBREAD: Characterization of Optically Smooth Reflector Parts
- Measurement of Rayleigh Scattering in Liquid argon at Vacuum Ultraviolet Wavelengths
- M2e-Extinction Monitor Research & Development
- DarkNES: Characterization of Space Multi-Chip Module Skipper-CCDs
- Detector Related Uncertainties in ICARUS

<https://indico.fnal.gov/category/1214/>

Projects from CCI Interns

- Localized Tuning of Particle Accelerator Focusing
- Synchrotron Design and Methodical Cell Optics Study
- (NOICE) Neural Optical Image Categorizer for the E-log
- Vacuum Simulation and LED Strip Tracker for MAGIS-100
- R&D of Remote Motion Table and Designing a small ripple power supply from 1000 A to 50 parts per million
- Radiation Cleaning Robot
- AD Robotics
- A long Reach robotic Arm
- Scrubland Management Plan for Habitat Restoration
- Study of NuMI Beam Spot Size to Build a Regression Model
- Muon Beams: Tungsten Targetry Analysis for MTA and PIP-II
- 3D Stereoscopic Inspection Camera
- Accumulator Ring Beam Optics
- Study of clustering methods of Linac outages: K-Means vs G.M.M

<https://indico.fnal.gov/category/1215/>

Weekly Meetings

Dates	Group Meetings
June 10 (3:00 pm)	First meeting (General Overview of the program)
June 17 (2:00 pm)	Introduction of the Research Projects
June 24 (2:00 pm)	Meet with a scientist
July 1 (2:00 pm)	Meet with a scientist
July 8 (2:00 pm)	Meet with a scientist
July 15 (2:00 pm)	Meet with a scientist
July 22 (2:00 pm)	Meet with a scientist
July 29 (2:00 pm)	Meet with a scientist
August 06 (2:00 pm)	Post-survey deadline
August 07 (2:00 pm)	Poster presentation
August 08 (2:00 pm)	Paper and peer review submission

Lectures and Seminars

SUMMER 2024

LECTURE SERIES

STEM Frontiers:
Exploring Innovation
Across Disciplines

May 23 – July 18
Tuesdays and Thursdays* | 1 p.m.
Join us in person or via Zoom!

*There will be no lecture on Thursday, July 4 due to the holiday.

For more information and Zoom meeting links, **scan the QR code!**



<https://internships.fnal.gov/virtualportal/program-calendar/key-dates/undergraduate-lecture-series/>

05.23	WELCOME TO FERMILAB Jim Amundson One West
05.28	INTRO TO PARTICLE PHYSICS Joshua Barrow One West
05.30	INTRO TO ACCELERATORS Jeffrey Eldred Curia II
06.04	INTRO TO PARTICLE DETECTORS Evan Niner Curia II
06.06	NEUTRINO PHYSICS Meghna Bhattacharya Curia II
06.11	INTRO TO COSMOLOGY Dan Hooper One West
06.13	Mu2e EXPERIMENT Kevin Lynch One West
06.18	MUON PHYSICS AT FERMILAB/g-2 David Kessler One West
06.20	SEARCH FOR A THEORY OF EVERYTHING Don Lincoln One West
06.25	QUANTUM COMPUTING Hank Lamm One West
06.27	MAGIS-100 EXPERIMENT Rob Plunkett One West
07.02	PARTICLE PHYSICS AT CMS Karri DiPetrillo One West
07.09	ENGINEERING AT FERMILAB Mayling L. Wong-Squires One West
07.11	INTRO TO SRF TECHNOLOGY Jeremiah Holzbauer One West
07.16	MEDICAL PHYSICS APPLICATIONS AND AI Maryellen Giger One West
07.18	BE SEEN: APPLYING FOR GRAD SCHOOL AND FELLOWSHIPS Richard Wallace One West

Fermilab

- Students get the opportunity to hear about latest developments:
 - Fermilab Theory Seminars
<https://indico.fnal.gov/category/1434/>
 - Particle Astrophysics Seminar
<https://astro.fnal.gov/events/seminars/>
 - Joint Experiment-Theoretical Physics Seminar
<https://theory.fnal.gov/jetp/>
 - All Fermilab Seminars and Colloquium:
<https://news.fnal.gov/fermilab-at-work/seminars/>

Current and previous interns visiting ICARUS Experiment

