



# Undergraduate Research Opportunities

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on behalf of the US-ATLAS Operations Program



# Undergraduate Research

Lots of ways to get involved with research as an undergraduate:

- ❖ Research Experience for Undergraduates (REU)
  - Many around the country, on ATLAS and other projects
- ❖ Programs at DOE National Laboratories
  - Science Undergraduate Laboratory Internships (SULI)
  - Community College Internships (CCI)
- ❖ Programs associated with CSU
  - NUPAC + summer research
  - CalBridge summer research program
- ❖ Programs run by experiments
  - PURSUE (run by US-CMS)
  - SUPER (run by US-ATLAS)



# REU Programs

REU's are located all over the country, focusing on a number of different areas of science. [Over 60 different programs in physics!](#)

- ❖ Funded by the National Science Foundation
- ❖ ATLAS-specific programs at Columbia, Michigan, Indiana, Stony Brook, Oklahoma, probably others
- ❖ Funded, summer-long program with mentoring
- ❖ Most sites will start advertising/accepting applications in December/January
  - Applications are to individual sites!



# REU @ CERN

One of the REU programs is associated with the CERN Summer Student Program:

- ❖ See the [University of Michigan REU page](#) for information

**SUMMER UNDERGRADUATE RESEARCH EXPERIENCE**  
at CERN in Geneva, Switzerland

Students selected for the program will spend June and July working with active research groups at CERN, one of the world's premier international laboratories. CERN is the home of the web and the site of the Large Hadron Collider.

- Participate in the renowned CERN Summer Student Lecture Program
- Join active researchers at CERN
- Get support from an on-site coordinator from the University of Michigan
- Receive a stipend and travel reimbursement

For more information or to apply, visit our web site:  
<http://www.um-cern-reu.org>

Eligibility: Students must be registered at an accredited 4-year institution, be in their junior or senior year with a concentration in physics, engineering or computer science. The program is open to U.S. citizens and permanent residents. The program will be administered by the University of Michigan Department of Physics with support from the National Science Foundation.

CERN photo: Simulation by the ATLAS experiment of the decay of a Higgs boson into 4 muons

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The University of Michigan is an equal opportunity/affirmative action employer.





# National Laboratories

- ❖ Science Undergraduate Laboratory Internships (SULI)
  - Sessions in the summer (10 weeks), Fall and Spring (16 weeks)
  - Located at ~17 national labs across the country
  - Wide variety of research opportunities, including ATLAS
    - Lawrence Berkeley National Lab (LBNL); Berkeley, CA
    - Argonne National Lab (ANL); Illinois
    - SLAC National Accelerator Lab (SLAC); Palo Alto, CA
    - Brookhaven National Lab (BNL); New York
  - Applications due Jan. 10th
- ❖ Community College Internship (CCI)
  - Aimed at those interested in technical careers that support laboratory science. Similar in structure to SULI.



CCI  
Community College Internship





# Cal State University Programs

If you are a Cal-State student, there are special opportunities:

## Research Opportunities

for CSU Students to Work on ATLAS Experiment  
of the LHC at CERN in Geneva, Switzerland during Summer

Introduction of the CSU Nuclear and Particle Physics Consortium (NUPAC)

- ❖ [NUPAC](#) offers a path to working on the ATLAS experiment (at CERN!) during the summer.
- ❖ [CAMPARE](#) is like an REU program, but limited to CalBridge Institutions.
  - Scholars receive stipends, travel costs, help finding housing, etc.



# PURSUE (US-CMS)

CMS launched their Program for Undergraduate Research SUMmer Experience (PURSUE) in 2022.

arXiv > physics > arXiv:2209.10109

Physics > Physics Education

*[Submitted on 16 Sep 2022 (v1), last revised 26 Oct 2022 (this version, v2)]*

**U.S. CMS - PURSUE (Program for Undergraduate Research SUMmer Experience)**

Similar in scope to the ATLAS SUPER program (next slide) but was run as a pure-virtual program in 2022.

- ❖ Lots of training activities, networking events, lectures, etc
- ❖ Students matched with mentors to work on projects
- ❖ 10 weeks, \$6,000 stipend

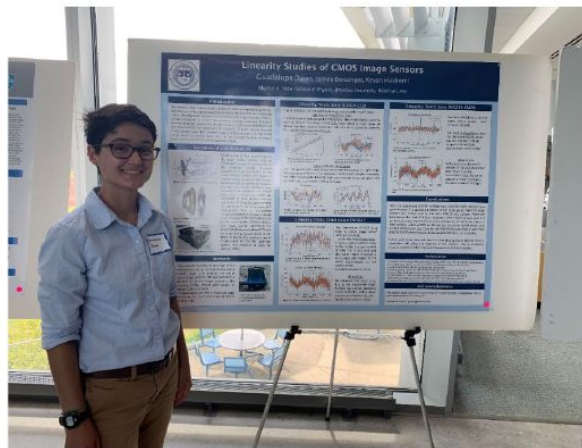


# SUPER (US-ATLAS)

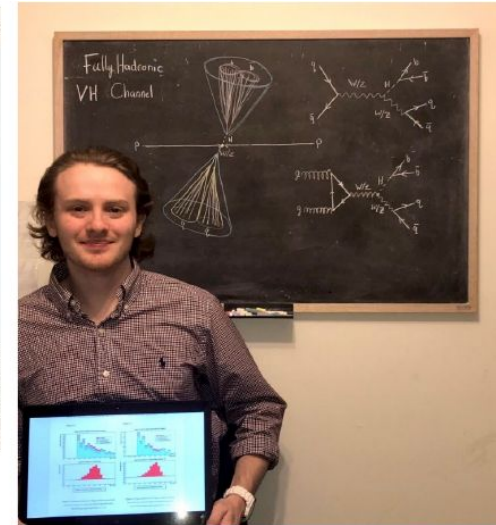
US-ATLAS has run the Summer Undergraduate Program for Exceptional Researchers (SUPER) program since 2019.



*Sabrina Corsetti, U. Michigan*



*Guadalupe Duran, Brandeis*



*Brendan Barry, Umass Amherst*

Two different tracks available:

1. For students already doing work with a US-ATLAS researcher, they can be supported to continue their work
2. For students from Minority Serving Institutions without an ATLAS program, they can receive a stipend + travel expenses to travel to work with a US-ATLAS group.





# SUPER (US-ATLAS)

## Details of the program:

- ❖ Stipend of around \$5,000 for 8 weeks
- ❖ End-of-summer [symposium](#) of short talks from SUPER participants
  - With prizes for “winners” of the symposium
- ❖ Call for applications will go out in early 2023
- ❖ Application process:
  - Short proposal for summer project (for track #1) or personal statement (for track #2)
  - CV
  - Contact information for references
- ❖ Much more information on the program website:  
<https://www.usatlas.org/super-program>

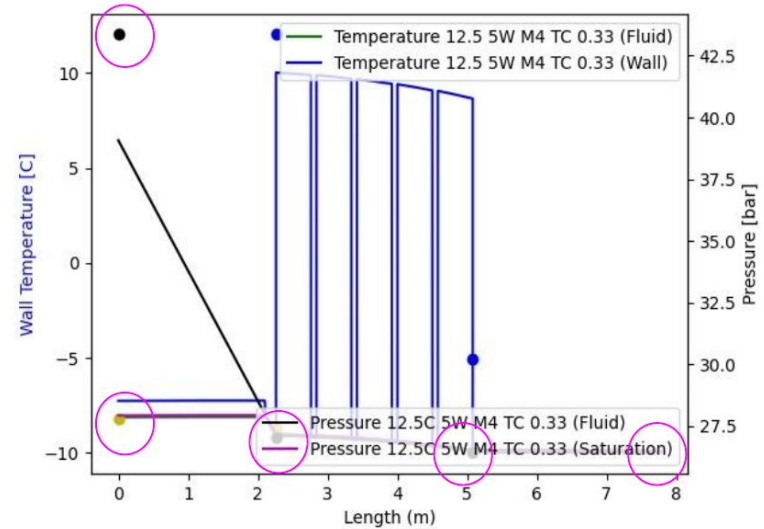


# SUPER (US-ATLAS)

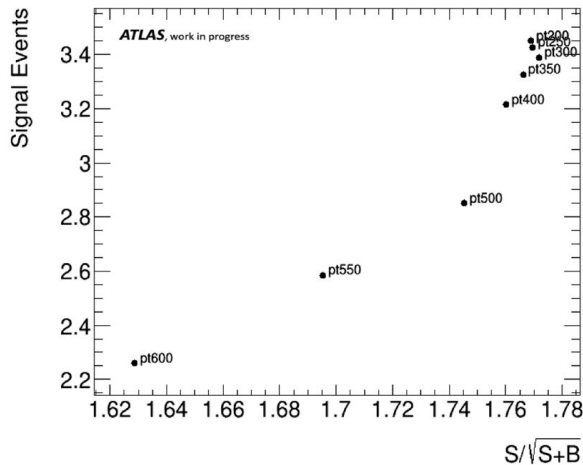
## Examples of MSI student projects from 2022:



Metrology of silicon pixel modules for the ATLAS inner tracker upgrade (Daniel Perez @ Argonne National Lab)



Simulating an evaporative cooling system for the ATLAS pixel tracker upgrade (Savena Soidara @ University of Massachusetts)



Optimizing a search for Vector-Like Quarks (Yarelis Acevedo @ Oklahoma State University)



# Conclusions

Many ways to get involved!

- ❖ Summer programs are a good way to meet new colleagues, learn new skills, and work on “real” research projects
- ❖ Most programs have application deadlines starting in December/January
  - Keep your eyes out for Summer 2023 announcements starting in November
- ❖ SUPER program will be expanding the MSI track in 2023
  - More sites/opportunities
  - More students accepted into the program
  - Please apply!