Physics & Astronomy

Summer Research Experience Opportunities
Opportunities

• Off campus summer research internship: Research Experience for Undergraduate (REU) sites & others
  • Especially for sophomores/juniors considering graduate school

• Off campus summer non-research internship
  • For students interested in or considering entering industry

• On-campus research with faculty in the Department of Physics and Astronomy
  • Many students do this after their freshman year!
Benefits of Participation in Summer Internship

• Experience what being a physicist is really like
• Hone practical skills (trouble shooting equipment, coding, etc.)
• Bolster your resume with real work experience, conference presentations, publications
• Travel (either for an off-site REU or to a conference)
• Get started on a senior thesis
• FUN!!!
REU Sites

• NSF REU sites are listed at

• NASA Space Grant Program:
  - http://astro.cornell.edu/specialprograms/spacegrant/

• Application deadlines vary from site to site. The earliest deadlines tend to be around mid to late December. Don’t limit yourself by inaction: Start looking now!

• Programs only open to US citizens and permanent residents.

• Programs are competitive…but there are lots of them!

• Compensation
  – Amount varies from site to site (Typically $4000 - $6000)
  – Stipend + housing (may be combined or split)
  – Travel expense (usually compensated)
Wow! That’s a lot REU Sites. Where do I start?

Do you need help narrowing it down?
- Look at the research projects/research topics covered
- Look at the dates of the programs
- Contact the programs directly with questions

Tips on what not to do:
- Don’t only apply to only one program
- Don’t wait too long (start now!)
- Don’t limit yourself based on research topic or location
Advertised REU Sites

The following schools have contacted at least one faculty at Union advertising their REU.

• Michigan State
  Deadline Feb 1st
• Cornell Astronomy
  Deadline Feb 4th
• Kansas State
  Deadline Feb 15th
• University of Alabama at Birmingham
  Deadline March 15th
Non REU Internships

• Union College Career Center
  ● [https://www.union.edu/becker-career-center/student-resources/internships/internship-search-resources](https://www.union.edu/becker-career-center/student-resources/internships/internship-search-resources)

• Government positions
  ● [https://stemundergrads.science.gov/](https://stemundergrads.science.gov/)

• International programs
  ● [https://www.daad.de/rise/en/](https://www.daad.de/rise/en/) (Deadline has passed!)
  ● [http://thinkswiss.tumblr.com/About](http://thinkswiss.tumblr.com/About)

• Application deadlines vary from site to site but many of them are very soon. If you’re interested you need to start the application process now.
On-campus

• Approach faculty and convince them to take you as a student

• Apply for a Union College Summer Research Fellowship
  – Apply online at: http://muse.union.edu/undergraduate-research/summer-research/
  – Application deadline 11 PM Thursday February 14th
  – Prepare a research proposal (faculty will help you)
  – Prepare a resume

• Compensation (based on last year’s numbers: estimates)
  – 8 weeks = $3800
  – 6 weeks = $2850
  – 4 weeks = $1900
  – Housing available for $75/week

• Funds set aside to pay students to help with the move to the new building

• **Many opportunities are contingent on the state of our building during the summer.**
What do you need to prepare?

• Different for each program. Read the application carefully!

• There are common themes
  – A resume
    ■ Work with the Career center
  – An statement/essay of research interest
    ■ Work with the career center
    ■ Ask the professors
  – Recommendation letters
    ■ Give us plenty of warning!
Prof. Samuel Amanuel

Nano scaled materials and properties

**Not taking any students this summer.**

Is interested in working with students during the academic year.

- Dynamic and thermodynamic properties of nano materials, especially their melting and freezing behaviors.
- Studying the science behind roasting coffee beans.
Prof. Rebecca Koopmann

Extragalactic Astronomy

- 2-3 students, 4 or 6 weeks, depending on funding (College, NASA space grant)*

- Optical and radio observations of nearby galaxies:
  - Analysis of optical images from Kitt Peak National Observatory to determine stellar and star formation properties
  - Analysis of radio observations from Arecibo Observatory to determine hydrogen gas content and mass

- Projects will include use of astronomy software and programming in python

* Depends on conditions in the building for summer research
Prof. Scott Labrake

Union College Ion Beam Analysis Lab

- 1-2 students, 6 weeks
- Ion-beam analysis of environmental materials
- Develop the quantitative analysis procedure to measure concentrations of per- and polyfluoroalkyl substances (PFAS) in soil and water samples using proton-induced gamma-ray emission (PIGE).
Prof. Seyffie Maleki

Conservation of cultural heritage

• Up to 3 students

• Analysis, chemical or physical, of paintings, sculptures, objects, buildings, etc.
  • Currently the focus of my lab work is to identify materials used in early 17th C paintings here in the New Netherland.
  • I use micro-Raman and STEM to learn about this samples.
January 11, 2018

Prof. Nelia Mann

Theoretical and Computational Physics

**Not taking students this summer**
Prof. Jonathan Marr

Radio Astronomy

- 1 student

- Develop and test radio astronomy labs using MIT's Haystack 18-meter telescope.
  - Includes observations of masers in star formation regions.
  - Will likely involve one or two day trips to Westford, Mass.
Prof. Chad Orzel

Optics

• 1-2 Students*

• Working on optical tweezers (using focused laser beams to manipulate microscopic objects)

• Quantum optics with correlated photon pairs

• Developing laser experiments for use in PHY-300

• Developing video analysis projects for use in the intro classes

* Depends on conditions in the building for summer research
January 11, 2018

Prof. Mike Vinyard

1-2 students, 6 weeks

Ion-beam analysis of environmental materials

- Develop the quantitative analysis procedure to measure concentrations of per- and polyfluoroalkyl substances (PFAS) in soil and water samples using proton-induced gamma-ray emission (PIGE).

Union College Ion Beam Analysis Lab
• 1-2 students for 6 or 8 weeks

• Modeling of the maturation process of HIV (mostly computational)

• Statistical mechanics of branched polymers (theory and computation)

• Forces on inclusions in cell membranes (theory and computation)
**Not taking any students for research this summer.**

1-2 Students for 4 weeks to help move lab at the end of summer.
Prof. Francis Wilkin

Observational Astronomy

• Up to 2 students:
  – Working at the observatory on imaging using new autoguiding and adaptive optics. Studying exoplanets and asteroids.
  – Modeling stellar winds in a rotating frame of reference (theoretical)