

Summer Physics Internship for High School Students

Marshall University Physics Department Outreach Internship Program provides WV high school students with an opportunity to conduct hands-on research under mentorship of physics professors. The goal of the program is to give the high school students the introduction to scientific research and the chance to discover their interests.

The program has a stipend of \$100 per student per week. The number of seats is limited. Interested students should fill in the enclosed application form and send to Ms. Traci Curry, the Physics Department secretary, at curryt@marshall.edu ASAP. The dead line of the application is June 10, 2021. No application fee is required.

Following are our projects available for summer 2021. Project 1 could be done remotely, projects 2 must be done in- person.

1. Project 1: 4-week Physics Playground in Python

This is a 4-week hands-on introduction to computer simulations in physics, using the Python programming language within the Jupiter Notebook interactive environment. No experience in coding is required. We will start with building a cannonball simulation, followed by rocket launching, satellite and planetary orbits, and ending with colliding black holes. If you have a good background in mathematics (algebra required; trigonometry strongly recommended) and are interested in learning more about physics and space, you could apply).

2. 1-week Projects (May 26-June 4, June 14-July 9)

Industrial "1 week" Project 2A:

1. wind a heavy-duty electromagnet solenoid ... connect banana jacks
2. map axial magnetic field vs current ... monitor coil temperature vs time
3. proto-type neodymium magnets (2 -4 stacks) for axial field "booster"

Commercial "1 week" Project 2B:

1. calibrate spectrometer arm angle in Pasco software (from rotary motion wheel on turn-table)
2. install custom (prototype) pulley bracket for prism table half-angle
3. test for accuracy and optimize ... test for hysteresis to minimize it
: (potential follow-ups)
4. prototype mounts and brackets for various polarizer & analyzer plates
5. prototype lamp holder & collimator & filter for other light sources

Delicate "1 week" Project 2C:

1. measure focal lengths for 2 concave mirrors
2. install on bracket, align as confocal Fabry-Perot interferometer cavity
3. measure cavity's finesse at 3 to 5 wavelengths (various reds)
4. might need to make and align another cavity in order to do (3)

Practical Frustration "1 week" Project 2D:

1. dis-assemble small turbo-molecular (vacuum) pump to rotor bearing
2. remove bearing; repair or replace (with new) or upgrade (with mag-lev)
3. re-assemble, test on vacuum chamber with thermocouple & ion gauges

**APPLICATION FORM
MARSHALL SUMMER INTERNSHIP 2021**

First Name

Last Name

Email

Phone

Address

High School

Grade

High School GPA

Which subjects are you interested in at High School?

What are your interests?

Which Summer Project(s) from the list are you interested in (1, 2A, 2B, 2C, 2D)?

Which time (week, month) are you available to work?

-Week: from to

-Morning or Afternoon:

