Project Title:
Understanding the heating mechanism of the solar atmosphere

Project Reference Code:
UAH-Yalim

Host Facility:
The University of Alabama in Huntsville

Host Facility Location:
301 Sparkman Dr.
Huntsville, AL 85899
https://www.uah.edu

Project Description:
The physics of the solar atmosphere is complex. The plasma temperature from the visible surface of the Sun, called 'photosphere', to the outer layer of the solar atmosphere, called 'corona', increases from ~5,000 K to ~1 million K over a distance of only ~10,000 km through the lower layers of the solar atmosphere called 'chromosphere' and 'transition region'. How is the solar atmosphere heated? Why does the temperature of the solar atmosphere increase with height unlike the Earth's atmosphere? These questions are related to a hot topic in the field of solar physics that has been investigated for many decades. Today, it is widely believed that the complex magnetic field structure of the Sun is responsible for the heating of the solar atmosphere.

In this project, I am looking for an enthusiastic student who would like to investigate the heating mechanism in the lower layer of the solar atmosphere called 'chromosphere'. The mechanism to be investigated is Ohmic heating due to magnetic resistivity. Wherever electric currents are present in the chromosphere, this heating mechanism plays a role. This project is a data analysis project that involves utilizing observational data from a ground-based telescope operated by National Solar Observatory called Dunn Solar Telescope as well as from space-borne instrumentation, in particular Helioseismic and Magnetic Imager onboard NASA's Solar Dynamics Observatory spacecraft. By utilizing measured plasma quantities such as temperature and magnetic field, the time-dependent variation of the Ohmic heating will be calculated by using a model that I developed and published in prestigious astrophysics journals. The student will primarily work with IDL programming language and gain experience in writing scripts and data analysis. If you are interested in investigating an exciting topic of solar physics, you're welcome to join this effort.

Disciplines:
Physics, Math, Computer Science, Space Science

Is U.S. citizenship required to participate in this project?
No

Internship Location and COVID-19 related Backup Plan
The internship location is at the University of Alabama in Huntsville. We are planning for an in-person

internship. However, due to the continuing COVID-19 pandemic, we are preparing additional options to ensure that the internship will take place, such as a hybrid or fully virtual option.

Name(s) of Mentor(s) and contact information:
Mehmet Sarp Yalim (msy0002@uah.edu)

Internship Coordinator/ HR manager:
Dana Waller (dsw0012@uah.edu)

The name and contact information of personnel at the host facility is provided for further assistance with questions regarding the host facility or the project.

Interns will not enter into an employee/employer relationship with the host facility. No commitment with regard to later employment is implied or should be inferred.