Internship Focus: Studying the Star Formation Process with the Smithsonian Submillimeter Array

Collaborating Institutions/Academic Departments:

- Yale University, Department of Astronomy
- Smithsonian Astrophysical Observatory

Advisors:

- Prof. Héctor G. Arce (Yale)
- Dr. Philip C. Myers (Smithsonian)

Internship type: Undergraduate

Internship Description

We are interested in understanding the star formation process for solar-type stars. Our group has engaged on a very large project using the Submillimeter Array telescope on Mauna Kea called MASSES (the Mass Assembly of Stellar Systems and their Evolution with the SMA). The MASSES survey is a high-resolution survey that maps molecular gas around all 74 protostars in the Perseus Molecular Cloud. These observations represent the largest high-resolution molecular line survey in a single star-forming region to date, allowing for robust statistical constraints on the star formation process. Since we know the approximate evolutionary stage of each protostar, we can piece together the history of how stars like our sun form. The student will investigate how these protostars evolve through time by analyzing one or more of the following: the dense gas kinematics, the energetics of protostellar outflows, outflow/envelope morphologies, dust properties, and angular momentum profiles. Such studies will help us understand how young stars evolve into stars like our sun. The student will learn how visualize and analyze spectral and continuum sub-millimeter interferometer data to conduct the study using various astronomy software and writing their own computer codes. The research will be based at the Smithsonian Astrophysical Observatory (SAO), in Cambridge, MA, which is part of the Harvard-Smithsonian Center for Astrophysics (CfA). The CfA hosts different undergraduate summer research programs and the student will be able to interact with a large cohort of students during the summer. The student will have the opportunity to continue this research at Yale during the academic year if he or she desires.

Internship Learning Objectives:

1. learn how to work with and analyze millimeter interferometer astronomical data.
2. earn how to use astronomical data and image processing software
3. gain experience writing computer codes to analyze and visualize data
4. learn to use various statistical methods to analyze large datasets
5. gain experience in written and oral science communication

Length: 8 weeks in summer
Stipend: $3600 – $5200 (depending on housing arrangement) + $300 for travel
How to apply:
Send the following materials by Friday March 29 to Prof. Héctor G. Arce via email (hector.arce@yale.edu)
  • a one-page statement indicating why you are interested in working in this internship (it could be the same or very similar to the one you sent to another summer internship program).
  • unofficial transcript (plus a list of courses you are taking this semester)
  • have one or two professors send a letter of recommendation to Prof. Arce (the letter can be the same letter the professor recently submitted to another summer internship program).

For inquiries or if you need more time to send your application please email Prof. Héctor Arce at them email listed above.