

**Opportunity Title:** Studies of Dust and Gas in Star Formation

**Opportunity Reference Code:** 0036-NPP-NOV23-JPL-Astrophys

**Organization** National Aeronautics and Space Administration (NASA)

**Reference Code** 0036-NPP-NOV23-JPL-Astrophys

**Application Deadline** 11/1/2023 6:00:59 PM Eastern Time Zone

**Description** This research will focus on determining the structure of dense cores in molecular clouds. Young stars form within these condensations, which are characterized by enhanced densities but modest temperatures between 10 K and 20 K. In order to understand the evolution of these cores to stars, we need to unravel their density distribution, which is best traced by thermal dust emission. Determining the column density from the dust continuum, requires good knowledge of the temperature distribution. All of this information resides in far-infrared and submillimeter images of these cores which can be obtained with the CSO and other submm telescopes, as well as the Herschel Space Observatory. To analyze the images, we have available the COREFIT program developed at JPL, which fits a model to a data set, and which allows for super resolution to obtain maximum possible angular resolution. Working with this program applied to existing and forthcoming core images, as well as with maps of various molecular lines serving as tracers of cloud kinematics obtained with the CARMA array, the SMA, and other facility, we can determine the present structure of these cores and their likely future evolution. From accurate measurements of the mass of such cores, we can determine the core mass function and by comparing it to the stellar initial mass function, find out what are the key steps in the transformation of a dense core to a star or stars. 2007 ApJ 655, 351-363. Massive Quiescent Cores in Orion. I. Core Mass Function 2006 ApJ 646, L77-L80. Images of the Vega Dust Ring at 350 and 450 Microns: New Clues to the Trapping of Multiple-Sized Dust Particles in Planetary Resonances

**Location:**

Jet Propulsion Laboratory  
Pasadena, California

**Field of Science:** Astrophysics

**Advisors:**

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**Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States.** A complete list of Designated Countries can be found at: <https://www.nasa.gov/oiir/export-control>.

Eligibility is currently open to:



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- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

**Eligibility Requirements**

- **Degree:** Doctoral Degree.