

Near-Stellar Gas and Dust

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Dust continuum emission from circumstellar material in the immediate environments of stars provides a valuable probe of the formation and evolution of stellar and planetary systems. High resolution millimeter and submillimeter wavelength observations are uniquely capable of determining the mass and temperature distributions in material 10 to 1000's of AU from solar type stars. This material is an integral part of the star formation process and is the gas and dust rich birthplace of planets.

Current observations are providing insights into the frequency of circumstellar disk in young systems, the evolution of disks, the circumstellar environment of young multiple star systems, and the nature of debris disks. At the highest resolution, we are beginning to resolve disks to get estimates of sizes and rough radial distributions. The ALMA is a major leap forward in sensitivity and resolution which will enable the study of disks and debris material on the scale of AU's in a large number of systems. At its highest resolution, ALMA is capable of detecting disk holes and gaps which are expected to be signpost of well-developed planetary formation. It may also be possible to detect localized over-densities in the disk associated with protoplanetary activity.

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