Protoclusters Forming Low Mass Stars

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While most stars are believed to form in clusters, our current understanding of the star formation process is largely limited to isolated cloud cores and single protostars. To make progress, detailed observational studies of the genesis and evolution of prestellar condensations in cluster-forming cloud cores are of prime importance. Recent wide-field (sub)millimeter continuum imaging of nearby protoclusters with the IRAM 30 m and JCMT telescopes (e.g. Motte, André, & Neri 1998), as well as with the OVRO interferometer (e.g. Testi & Sargent 1998), has made possible the identification of several dozens of cold, gravitationally-bound starless condensations in, e.g., ρ Oph and Serpens. Remarkably, the mass spectrum of these pre-stellar condensations resembles the shape of the stellar initial mass function (IMF), suggesting the IMF is at least partly determined by fragmentation at the pre-collapse stage of star formation. With present (sub)millimeter instrumentation, however, the dynamical properties of these protocluster condensations are difficult to assess, and only the nearest protoclusters are accessible. If ALMA can routinely mosaic fields up to 0.1 deg^2, its high resolution and sensitivity in both continuum and lines will allow a complete census of prestellar condensations and their properties to be taken in the major protoclusters of the Galaxy. This will greatly help develop a satisfactory theory of cloud fragmentation and star cluster formation.

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