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A Comprehensive Characterization of Protostellar Multiplicity within 500 pc

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The advent of efficient surveys at high resolution and sensitivity with ALMA (and the VLA) has enabled a comprehensive and robust characterization of protostellar multiplicity in the solar neighborhood (within 500 pc). We will present a characterization of multiplicity statistics for ~600 systems, comprising Orion, Serpens-Aquila, Perseus, Ophiuchus, and Taurus, representing the majority of low- to intermediate-mass protostars in the solar neighborhood. We have measured the separations of companion protostars from 1000s of au down to ~30 au. The distribution of separations typically exhibits two peaks, one at ~100 au and another at ~3000 au, and these peaks thought to result from disk and turbulent fragmentation, respectively. We compare the separation distributions between regions and to more-evolved samples, finding that protostars in the nearby star-forming regions are statistically indistinguishable from each other, but statistically inconsistent with more-evolved populations. Furthermore, there is tentative evidence for changes in multiplicity statistics as a function of evolution (i.e., protostellar class). Molecular line observations of close (< 500 au) multiples points to ~50% of close multiples forming within rotationally-supported structures, consistent with disk fragmentation, and outflows tend to be driven orthogonal to the projected plane of close companion sources. Finally, observations of close multiples at ALMA's highest available resolutions find correlated alignment of circumstellar disks around each protostar, further pointing to disk fragmentation for multiples with separations < 100 au.

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