

Orbital statistics of multiple systems formed from small-N subclusters

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We explore the multiplicity statistics (semi-major axis, period, eccentricity, degree of dynamical biasing, binary and tertiary mass ratios, mutual orbital inclination, and ejection velocity) of stars born in small-N subclusters using numerical N-body experiments. In these experiments, subclusters are evolved as if they are the fragmentation products of a single isolated prestellar core from which most of the natal gas has already been dispersed. Only two parameters are important: the number of stars in the subcluster, N , and the fraction of kinetic energy in ordered rotation, α_{rot} . We find that increasing N has the effect of systematically decreasing the binary semimajor axis and period, the degree of dynamical biasing, and the stellar ejection timescale, while increasing the number of high-eccentricity orbits and multiples formed. Changing N has very little effect on the semi-major axes or periods of higher-order orbits, or on binary or tertiary mass ratios. The main effect of α_{rot} is in moderating the distribution of mutual orbital inclination, with moderate α_{rot} producing a distribution of orbital inclinations for triple systems which is most consistent with observed values. Triples frequently form in high-inclination orbits without the assistance of von Zeipel-Lidov-Kozai cycles, and a significant proportion ($21 \pm 1\%$) of the cores produce more than one multiple.

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