Contribution ID: **7** Type: **not specified**

Orbital statistics of multiple systems formed from small-N subclusters

Tuesday 26 August 2025 11:40 (20 minutes)

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 ± 1%) of the cores produce more than one multiple.

Presenter: Ms AMBROSE, Hannah (Cardiff University)

Session Classification: Formation pathways