The binarity of massive young stellar objects

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Recent observations of massive OB stars have revealed a very large binary fractions (>80%), implying that binarity can have a large effect on the subsequent evolution of massive stars. However, it is unclear whether the multiplicity is primordial or not. There have been reports of individual binary young massive stars, but no dedicated observational surveys for binarity towards them have been published, while theory has not yet provided clear predictions. Here, we present an adaptive optics assisted VLT survey in the K band (2.12 um) of 32 massive young stellar objects (MYSOs) drawn from the RMS survey. This pilot survey probes a separation range between 0.2-3″, or 400-6000 au at the average MYSO distance of 2 kpc. We find 18 companions, corresponding to a binary fraction of 31+/-3% and a companion fraction of 53+/-3%. Despite the limited data on the companions, we are able to derive lower limits to the mass ratios. These exceed 0.5, which is larger than would result from randomly sampling the IMF, as the binary capture formation predicts. When compared to other samples of object at similar separation and mass ratio ranges, we show that the multiplicity fraction of MYSOs is larger than that of lower mass T Tauri or main sequence OB stars. This lends support to theories suggesting multiplicity increases with mass and decreases with evolutionary stage. Moving towards completing the separation-parameter space, we will finish with a brief overview of our ongoing interferometric results which reveal binary companions at milli-arcsecond scales.

Galactic Scale