P117a Dense cores at the early phase of high-mass star formation

Kaho Morii (Univ. of Tokyo / NAOJ), Fumitaka Nakamura, Patricio Sanhueza, Ken′ichi Tatematsu (NAOJ/SOKENDAI), Satoshi Ohashi (RIKEN), Takeshi Sakai (Univ. of Electro-Communications)

How high-mass stars form is under debate. An Infrared dark cloud, seen in silhouette against the bright galactic plane emission, is a cold, dense region of a molecular cloud, and is thought to be prior to high-mass star formation (HMSF). Toward an understanding of how high-mass stars form, we observed such regions mosaicked with ALMA at an angular resolution of $1''.2$, corresponding to $\sim$0.02 pc at 4 kpc with the ASHES program. Our targets are thirty-nine 70 μm-dark massive (220–4500) $M_\odot$, dense ($>10^4$ cm^{-3}), and cold (T $\sim$10–20 K) clumps at distances of 2–6 kpc. The ALMA 1.3 mm dust continuum emission revealed clumpy and filamentary structures with some presenting massive hub-filament systems.

We identified 911 dense cores in total from 1.3 mm continuum emission. The core mass ranges from 0.06 to 77 $M_\odot$. About 60% of the cores are low-mass ($M_{\rm core}$ $<$1 $M_\odot$), whereas $\sim$3% have $M_{\rm core}$ $>$10 $M_\odot$. There is no strong correlation between the core mass and clump mass. We investigated the core distribution using the minimum spanning tree (MST) method. The projected minimum core separations are found to be comparable to the thermal Jeans length of the parent clumps. We found a widespread core distribution rather than a centrally concentrated distribution and confirmed no mass segregation.

In this talk, we will focus on the 1.3 mm dust continuum emission analysis such as the core mass and its spatial distribution in the parent clumps.