P127a The relation of accretion to protostellar multiplicity and chemistry with Nobeyama

Nadia M. Murillo (RIKEN), Nami Sakai (RIKEN)

Mass accretion is a key process in star formation. It is currently understood that accretion is linked to protostellar luminosity, final stellar mass, and planet formation. However, several aspects of mass accretion are not yet understood. For example, how protostellar multiplicity or chemical complexity are related to mass accretion. Recent studies have begun to show the presence of elongated infalling gas structures, so-called accretion flows or streamers, around young stellar objects at scales of a few 1000 AU. This enables an initial glimpse into the relation between mass accretion and star formation at all mass ranges and evolutionary stages. We observed Perseus (d∼300 pc) using the FOREST frontend on the Nobeyama 45m Telescope. On-the-fly maps with a 6" grid at 90 GHz were observed toward six subregions. Our spectral setup covered low-J transitions of HCN, HCO^+, HNC, HC_3N, N_2H^+, ^{13}CO and $C^{18}O$ with a beamsize of ∼18" (∼4000 AU) and spectral resolution of $\sim$0.1 km s^{-1}. We derive gas distribution, temperature, and kinematic maps from the Nobeyama data. Additional physical and chemical parameters are derived by combining the Nobeyama data with our previously obtained APEX observations at 218 and 360 GHz. Our maps reveal that multiplicity is determined by mass, either from an initial massive clump or a continuously fed cloud core. By comparing the chemical complexity at scales $\lesssim$100 AU, previously obtained with ALMA, we find a possible connection between chemical complexity and mass accretion. We will discuss in detail this connection, and show the importance of observing various molecular species at different spatial scales.