P102a Infall, Outflow, and Rotation in the G19.61-0.23 Hot Molecular Core

○ Ray S. Furuya (Subaru Telescope, NAOJ), Riccardo Cesaroni (INAF-Arcetri, Italy), Hiroko Shinnaga (CSO, Caltech, U.S.A.)

The main goal of this study is to perform a sub-arcsecond resolution analysis of the high-mass star formation region G 19.61-0.23, both in the continuum and molecular line emission. Here we focus on the (sub)mm emission, devoting special attention to the hot molecular core (HMC). A set of multi-wavelength continuum and molecular line emission data between 6 cm and 890 μm were taken with the Very Large Array, Owens Valley Radio Observatory, and Submillimeter Array (SMA). These data were analyzed in conjunction with previously published data (Furuya et al. 2005, ApJ 624, 827). Our observations resolve the HMC into three cores whose masses are on the order of $10^1 - 10^3$ $M_\odot$. No submm core presents detectable free-free emission in the centimeter regime, but they appear to be associated with masers and thermal line emission from complex organic molecules. Towards the most massive core, SMA1, the CH_3CN ($18_K - 17_K$) lines reveal hints of rotation about the axis of a jet/outflow traced by H_2O maser and $H^{13}CO^+$ (1–0) line emission. Inverse P-Cygni profiles of the ^{13}CO (3–2) and $C^{18}O$ (3–2) lines seen towards SMA1 indicate that the central high-mass (proto)star(s) is (are) still gaining mass with an accretion rate $\geq 3 \times 10^{-3}$ $M_\odot$ yr^{-1}. Due to the linear scales and the large values of the accretion rate, we hypothesize that we are observing an accretion flow towards a cluster in the making, rather than towards a single massive star.

Reference: Furuya, Cesaroni, & Shinnaga, 2011, A&A 525, A72