AN ALMA SUB-ARCSECOND VIEW OF MOLECULAR GAS IN MASSIVE STAR-FORMING REGION G10.6-0.4

CHARLES JOHN LAW, *Department of Astronomy, Harvard University, Cambridge, MA, USA*; QIZHOU ZHANG, *Radio and Geoastronomy Division, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA*; KARIN I ÖBERG, *Department of Astronomy, Harvard University, Cambridge, MA, USA*; ROBERTO GALVÁN-MADRID, *Centro de Radioastronomía y Astrofísica, Universidad Nacional Autónoma de México, Morelia, Michoacán, Mexico*; ERIC KETO, *Institute for Theory and Computation, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA*; PAUL T. P. HO, HAUYU BAOBAB LIU, *Academia Sinica Institute of Astronomy and Astrophysics, Academia Sinica, Taipei, Taiwan*.

While massive star-forming regions are known to exhibit an extremely rich and diverse chemistry, few such sources have been mapped at high spatial resolution. Since the chemical structure of these sources displays substantial spatial variation among species on small scales ($\sim 10^4$ AU), high spatial resolution observations are needed to constrain chemical evolution models of massive star formation. We will present new ALMA 1.3 mm observations toward massive OB cluster-forming region G10.6-0.4 at a resolution of $0.12''$ (600 AU). While the kinematics of G10.6 have been extensively studied at centimeter wavelengths, sensitive and high angular resolution observations in the millimeter and submillimeter regime have been lacking. Given the high sensitivity and bandwidth of our ALMA observations, we are able to derive rotational temperature and column density maps toward the central $8''$ by $8''$ region of G10.6 for over 10 different species, including traditional warm gas tracers such as CH_3CN, shock tracers HNCO and SiO, and a variety of complex organic molecules. Combined with our simultaneous observations of ionized gas in hydrogen recombination lines, our exquisite spatial resolution allows us to constrain the chemical influences of massive stellar feedback in the form of highly structured and inhomogeneous molecular emission, prominent spatial anti-correlations between molecular and ionized gas, and order-of-magnitude variations in physical gas conditions.