Molecular outflows and hot molecular core in G24.78+0.08 at sub-arcsecond angular resolution

M.T. Beltran (1), R. Cesaroni (1), Q.Zhang (2), R. Galvan-Madrid (2), H. Beuther (3), C. Fallscheer (3) R. Neri (4), C. Codella (1) ((1) INAF-Osservatorio Astrofisico di Arcetri (2) CfA (3) Max Planck Institute for Astronomy (4) IRAM)

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Context. This study is part of a large project to study the physics of accretion and molecular outflows towards a selected sample of high-mass star-forming regions that show evidence of infall and rotation from previous studies. Aims. We wish to make a thorough study at high-angular resolution of the structure and kinematics of the HMCs and corresponding molecular outflows in the high-mass star-forming region G24.78+0.08. Methods. We carried out SMA and IRAM PdBI observations at 1.3 and 1.4 mm, respectively, of dust and of typical high-density and molecular outflow tracers with resolutions of <1". Complementary IRAM 30-m 12CO and 13CO observations were carried out to recover the short spacing information of the molecular outflows. Results. The millimeter continuum emission towards cores G24 A1 and A2 has been resolved into 3 and 2 cores, respectively, and named A1, A1b, A1c, A2, and A2b. All these cores are aligned in a southeast-northwest direction coincident with that of the molecular outflows detected in the region, which suggests a preferential direction for star formation in this region. The masses of the cores range from 7 to 22 Msun, and the rotational temperatures from 128 to 180 K. The high-density tracers have revealed the existence of 2 velocity components towards A1, one of them peaks close to the position of the millimeter continuum peak and of the HC HII region, and is associated with the velocity gradient seen in CH3CN towards this core, while the other one peaks southwest of core A1 and is not associated with any millimeter continuum emission peak. The position-velocity plots along outflow A and the 13CO averaged blueshifted and redshifted emission indicate that this outflow is driven by core A2.

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