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Probing gas inflow in starless clump candidates

Understanding the mass accretion history of high-mass stars and star clusters is a key unsolved topic in the field of star formation. In particular, measuring inflow at the onset of star formation is vital for understanding how high-mass protostars gain their mass. We investigate starless molecular cloud clumps (SCCs) blindly identified from the 1.1mm Bolocam Galactic Plane Survey that show no observational signatures of star formation activity at radio through midinfrared wavelengths. A survey of 101 SCCs with the ARO 12m Telescope identified six inflow candidates (M ~ 200-1500 solar masses). We present high-resolution followup of these inflow candidates from GBT/Argus and ALMA observations of HCO+, H13CO+, HCN, and NH2D. We find multiple effects that mimic global collapse signatures, mainly from previously undetected low-luminosity protostellar activity: (1) blending of narrow velocity components and dense cores with varying HCO+ excitation and (2) resolved outflows. Single-dish surveys investigating clump inflow velocities at >30" are likely to be similarly affected by the varied excitation conditions and outflows caused by undetected low-luminosity protostars. However, preliminary results show systematic blueward velocity offsets between the peak HCO+ and H13CO+ velocities in spatially resolved sub-structures. These may be caused by localized collapse and inflow at speeds slower than the ~1-2 km/s supersonic speeds typically inferred from the globally averaged line-profiles.