*From Stars to Galaxies, Gainesville, Florida, 7th-10th April 2010*

# First Results from CHaMP

Peter J Barnes, University of Florida

Yoshinori Yonekura[2], Andrew Miller[3], Martin Mühlegger[3], Tony Wong[4], Stuart Robertson[5], Lawry Agars[3], Yosuke Miyamoto[6], Naoko Furukawa[6], George Papadopoulos[3], Scott Johnson[3], Jonathan Tan[1], Audra Hernandez[1], & Yasuo Fukui[6]

[1] University of Florida [2] Ibaraki University [3] Sydney University [4] University of Illinois [5] ATNF [6] Nagoya University

The *Census of High- and Medium-mass Protostars* (CHaMP) is the first large-scale, unbiased, uniform mapping survey at ∼parsec-scale resolution of 90 GHz line emission from massive molecular clumps in the Milky Way. We present the first Mopra (ATNF) maps of the CHaMP survey region in the Carina arm using the $HCO^+$ $J$=1→0 line, a common "high-density" tracer, which shows emission from an ensemble of massive molecular clumps. From these maps we derive the physical parameters of the clumps, using standard molecular spectral-line analysis techniques, and find that there exists a large population of weakly-emitting (but easily detectable) massive molecular clumps, the properties of which are distinct from brighter massive star-forming regions that are more typically studied. These massive clumps (comprising 90% of our clumps by number) are typically optically thin, and with the possible exception of the brightest 10% of sources, are of significantly lower density than the line's critical density: thus, their $HCO^+$ is subthermally excited. The weakly-emitting clump masses range from ∼10 to ∼3000 $M_\odot$, with the brighter sub-population only in the top decade of this range (although the upper limit of the mass range may be systematically underestimated). Thus because of their number, the weakly-emitting clumps may also comprise the bulk (up to 80%) of the molecular mass in the Galaxy. Our clump population shows a relationship between the Virial and measured mass (e.g., as measured by the $\alpha$ parameter) that is similar to the Bertoldi & McKee (1992) prediction. They also have a wide range of velocity dispersions at low brightness, but a much smaller range of dispersions among the brighter clumps. This supports the idea that the weakly-emitting clumps are not gravitationally bound, but rather pressure-confined by their overlying GMC envelopes.

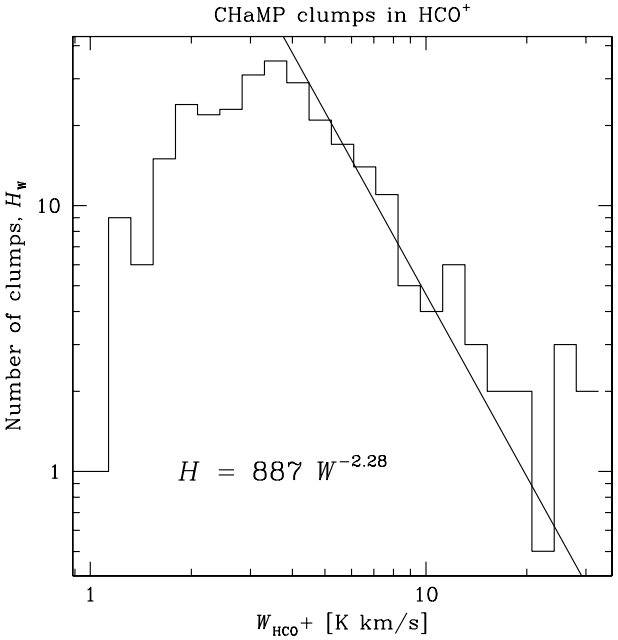


Figure 1: *$HCO^+$ source function.*

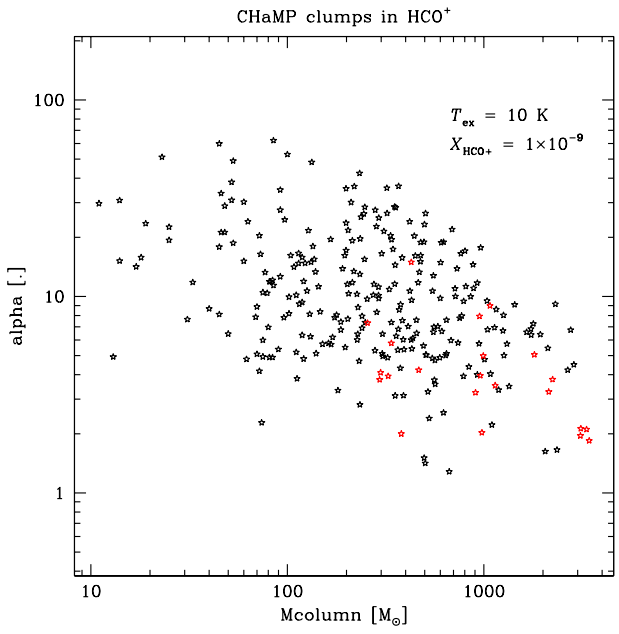


Figure 2: *Virial $\alpha$ vs $HCO^+$-derived clump mass.*