



### Abstract

This work, using <sup>12</sup>CO data taken from the Exeter-FCRAO Northern Galactic Plane Survey, supplemented by CGPS and VGPS HI data, maps the location of spiral structure of the Outer Galaxy in both space and velocity over the Galactic longitude range of 55° – 193° in CO (to be augmented, in this work, by Dame et al. 2001) and  $14^{\circ} - 184^{\circ}$  in HI. Using re-sampled, spatially convolved position-position-velocity maps of the spiral arm regions we present an extra-Galactic style view of the Milky

## 1) The Milky Way



Fig. 1 – Schematic view of the Milky Way showing approximate Ex-FCRAO coverage. Image credit: R. Hurt (SSC), JPL-Caltech, NASA.

All known sites of Galactic star formation exist within the spiral arms. The figure above shows a schematic view of the Milky Way, inspired by GLIMPSE observations, it shows the relative positions of the spiral arms. This work sets to extract the spiral arms from the data as one contiguous dataset at a common resolution to analyse and classify the molecular content of these regions. The arms to be extracted and modelled are the Perseus and Outer (sometimes called Cygnus) spiral arms. The figure below shows the longitude-velocity diagram in detected <sup>12</sup>CO.





Fig. 3 – Spatial fits to the spiral arm regions. Perseus arm tracers taken from Reid et al (2009), Outer arm tracers taken from Negueruela & Marco (2008)

This model assumes that exterior to an arm feature material is subject to a flat rotation curve, whereas, material traversing arm regions experience a shock (which is defined to be constant along the whole arm, but varies due to the line of sight) at some angle deviating from the arm centre. This angle must be positive and non-zero so that material doesn't flow indefinitely down the arm, see figure 4.



Using the model velocity, refined by fitting to the brightest <sup>12</sup>CO centroids Using these fits to longitude-velocity, the data's velocity axis is resampled to be arm centric. i.e. 0km/s velocity corresponds to the arm centre. This allows the arm to be able to be isolated kinematically [7] 800 allowing a whole spiral arm to be viewed at once as a single structure.  $\Xi$ However, it is important to note that there is still a distance ambiguity when selecting in velocity, since even in the outer galaxy one velocity 400 can correspond to more than one distance. Finally, we applied a gaussian smoothing kernel to the arm-centric maps to convolve them to a constant linear resolution.

## 3) The Data

Please open the poster for the full data section. The arm-centric maps [top], (l,b, mapped to a Common Resolution map [bottom] in arm, with X =being coincident with the anti-centre and where Z is height out of the b=0° plane.

References

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