STRUCTURE OF THE DENSE MOLECULAR GAS IN THE HELIX NEBULA: LARGE SCALE MAPPING OF HCO^+

N. R. ZEIGLER, L. M. ZIURYS, *Department of Chemistry, University of Arizona, PO Box 210041, 1306 East University Blvd, Tucson, AZ, 85721, USA*; L. N. ZACK, *Department of Chemistry, University of Basel, Klingelbergstrasse 80, CH-4056 Basel, Switzerland*.

The Helix Nebula, NGC 7293, has been mapped in HCO^+ J = 1 $\rightarrow$ 0 emission with a 70$''$ spatial resolution (1.68 km s^{-1} velocity resolution) using the Arizona Radio Observatory (ARO) 12 m telescope on Kitt Peak. Over 200 individual positions covering an area of roughly 1000 $\times$ 800 $''$ were observed down to a 3σ noise level of ~20 mK. HCO^+ was detected at over three-quarters of the positions, with the majority of spectra showing multiple velocity components indicative of a complex kinematic structure. The column density of HCO^+ across the Helix ranges from N_{tot} ~ 1.4 $\times$ 10^{11} to ~2.4 $\times$ 10^{12} cm^{-2}, with an average N_{tot} ~ 4 $\times$ 10^{11} cm^{-2}. The HCO^+ distribution, which traces gas with densities ~10^5 cm^{-3}, is similar to that of CO and H_2 , with certain point symmetries and red and blueshifted regions common in all three molecules; these data are also consistent with observations of atomic lines. The HCO^+ emission appears to trace two ring-like structures emanating from the central star: one is blue-shifted and the other red-shifted with respect to the star, and possibly trace the edges of a bipolar outflow.