FORMATION OF CH\textsuperscript{+}: SHOCK CHEMISTRY IN NGC 7027

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The formation of CH\textsuperscript{+} in the interstellar medium has been an enigma for the past 70 years. Emission from the species is found in diffuse material, even though the major pathway leading to the species, C\textsuperscript{+} + H\textsubscript{2}, is endothermic by 0.40 eV. The barrier for this reaction can be greatly reduced if the H\textsubscript{2} is vibrationally excited. Using the Heterodyne Instrument for the Far Infrared (HIFI) on board the Herschel Space Observatory, we have mapped CH\textsuperscript{+} (J = 1 \rightarrow 0), CH\textsuperscript{+} (J = 2 \rightarrow 1), and C\textsuperscript{+} (J = 3/2 \rightarrow 1/2) across the face of the young planetary nebula, NGC 7027. Analysis of the spectra has shown that CH\textsuperscript{+}, C\textsuperscript{+}, and vibrationally excited H\textsubscript{2} apparently trace the same outflow in NGC 7027. Therefore CH\textsuperscript{+} in this nebula likely forms from the activated C\textsuperscript{+} + H\textsubscript{2} reaction. Spectral maps, temperatures, and abundances of CH\textsuperscript{+} will be presented along with spectral maps of C\textsuperscript{+}. 