ASTRONOMICAL DETECTIONS OF VACUUM ULTRAVIOLET TRANSITIONS OF CH

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In the 1990s, three unidentified absorption lines near 1370 Å and another one near 1270 Å were detected in *Hubble Space Telescope (HST)* spectra of diffuse interstellar sight lines. These features were suspected of belonging to molecular carriers; the widest one at 1369.13 Å was hypothesized as being a vacuum ultraviolet (VUV) analogue of the ubiquitous diffuse interstellar bands seen in the visible. Eventually, all four features were assigned by Watson in 2001 to Rydberg transitions of CH, previously observed in laboratory spectra by Herzberg and Johns in 1969. Since all CH column densities to date have used optical CH transitions, especially the 4300 Å doublet, we analyzed *HST* spectra of sight lines with optically-derived CH abundances to confirm Watson's assignment of the VUV lines by measuring consistent f-values for them. In addition, we expanded the survey by searching for additional VUV transitions of interstellar CH. Two more CH bands were detected, $D-X$ near 1694 Å and $F-X$ near 1549 Å. Both measured f-values and, for the wider lines, predissociation lifetimes are found to be in agreement with theoretical calculations by, e.g., van Dishoeck in 1987. The 1369.13 Å transition from the $G-X$ (or $3d-X$) band remains the strongest and widest VUV feature of CH.