

OBSERVATIONS OF CO AND HCN ($J = 1-0$) IN NGC 2346 AND NGC 7293 WITH THE NOBEYAMA 45-m TELESCOPE

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ABSTRACT. Many positions in the planetary nebulae NGC 2346 and NGC 7293 have been searched for CO ($J = 1-0$) and HCN ($J = 1-0$) emission. The beam was 15 arcsec at 115 GHz.

NGC 2346 is a high excitation bipolar planetary with a binary central star of late spectral type (A5), whose unseen hot companion ionizes the nebula. Various studies have suggested occultation by a moving dust cloud (e.g., Costero *et al.* 1987). CO was observed at three beam positions in NGC 2346 and at the brightest position, HCN was definitely detected. CO was not detected beyond the edge of the visible nebula. The radial velocity structure is compared with that of the ionized gas from echelle measurements of the [N II] $\lambda 6583$ A line. The dominant narrow CO component at the rest frame velocity of the nebula does not correspond to any line component in the [N II] profiles, but a broader component at +25 km/s LSR corresponds to the brighter [N II] component. The -ve velocity [N II] component does not have associated CO. It is suggested that +ve velocity CO component must be smaller in extent than the nebula, but it cannot be determined if it is before or behind the central star. This component may be associated with the obscuring dust cloud.

CO was detected in NGC 7293 by Huggins and Healy (1986). We observed a small region over the outer bright shell to measure small scale variations in emission. Double CO profiles were found at six positions and their separation is similar to the expansion velocity of the nebula (Walsh and Meaburn 1987). A comparison of the CO brightness with that in H α and [N II] shows no obvious correlation, although CO tends to be brighter over the shell. The CO emission seems to arise on the outer edges of the nebula and not within the central ionized volume. No CO was detected over the outer filament observed by Walsh and Meaburn (1987) or from a bright cometary globule at the outer edge of the central hole.

The implications of these observations for the site of molecules in PN is discussed.