MILLIMETER-WAVE INVESTIGATION OF EVOLVED PLANETARY NEBULAE CHEMISTRY

EMILY D. TENENBAUM, STEFANIE N. MILAM, NEVILLE J. WOOLF and LUCY M. ZIURYS, *Steward Observatory, University of Arizona, 933 N. Cherry Avenue, Tucson, AZ 85721*.

We report the detection of C_2H and c-C_3H_2 in a number of evolved planetary nebulae. C_2H has been detected in NGC 6720 (Ring Nebula), NGC 7293 (Helix Nebula), and NGC 6781 via the two hyperfine components of the N=1→0, J=3/2→1/2 transition near 87 GHz, as well as in M4-9 via the two spin-rotation components of the N=3→2 transition near 262 Ghz. In the Helix Nebula, the $J_{Ka,Kc}=1_{2,0} \rightarrow 0_{1,0}$ and $10_{1,0} \rightarrow 9_{2,0}$ transitions of c-C_3H_2 have been detected near 85 and 105 GHz, respectively. These detections suggest that the molecular complexity in evolved planetary nebulae is higher than previously thought. It appears that as planetary nebulae expand and age, many-atom molecules may be shielded from UV dissociation because they are contained in dense knots of gas and dust. Further investigation of the gas-phase chemistry of evolved planetary nebulae is being conducted using the Arizona Radio Observatory telescopes.