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Molecular gas after the AGB: the cases of V Hydrae and KJPN 8

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Post-AGB stars play a significant role in enriching and advancing the chemical complexity of the Universe. During the late stages of low-to-intermediate mass stellar evolution, substantial outflows of dust and gas are injected into the interstellar medium (ISM). Post-AGB stars undergo significant intrinsic changes, and, in a notable proportion, they also experience changes induced by companions, disrupting their AGB circumstellar envelopes and activating complex chemistry. These changes include stellar evolution towards the white dwarf phase, which enhances the emission of UV photons from the central star, and shocks due to interactions with binary companions. These factors lead to an enhancement of photo-induced processes and shocks, which can dissociate and ionize material, and form structures such as disks, tori, and elongated gas and dust outflows.

In this presentation, I will discuss the latest results from our post-AGB studies of the molecular outflow of V Hydrae and the disk of KJPN 8, using data from APEX and the IRAM 30m telescope, respectively. The complete molecular inventory of V Hydrae remains unknown, which biases our interpretation of the chemical richness of evolved stars, particularly towards AGB sources. Our observations of V Hydrae have revealed the presence of CO, SiC2, HC3N, SiS, and CCH, among other typical molecules and isotopologues found in carbon-rich post-AGB sources. KJPN 8 is surrounded by a molecular disk displaying the characteristic content of a young Planetary Nebula (PNe): CO, HCN, HNC, CN, and HCO+, including several isotopologues. Additionally, we have detected marginal emission of CS. Our analysis of the data obtained thus far has yielded intriguing results. By examining isotopic ratios and species ratios such as HCN:HNC, we aim to constrain the progenitor nature of KJPN 8, which remains unclear.

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