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Keplerian disks and outflows around binary post-AGB stars.

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Abstract

There is a class of binary post-AGB stars that systematically shows evidence of the presence of disks. All of them present a remarkable NIR excess and the narrow CO line profiles characteristic of rotating disks. Their spectral energy distributions (SEDs) reveal the presence of hot dust close to the stellar system, and interferometric IR data have confirmed its disk-like shape. These disks must be stable structures because their IR spectra reveal the presence of highly processed grains. Observations of CO through single-dish and interferometric observations confirm the presence of another structure surrounding the disk with expansion velocity.

This contribution explores the existence of two subclasses of nebulae around binary post-AGB stars: the disk- and the outflow-dominates sources. Our interferometric maps (in the ^{12}CO and ^{13}CO $J = 2-1$ lines) and our models confirm this bimodal distribution. The disk-dominated sources, such as AC Herculis, contain $\sim 90\%$ of the material of the nebula located in the rotating disk. On the contrary, the outflow-dominated sources, such as 89 Herculis, contain $\sim 70\%$ of the nebular material located in the massive outflows, which are mostly composed of cold gas.

The existence of these different subclasses does not support an evolutionary path between them, since the post-AGB phase is believed to be fast compared to the evolution of this type of nebulae (around 10^4 a). Therefore, the existence of both the disk- and outflow-dominated sources could be due to a different initial configuration of the stellar system.

Our deep single-dish radio molecular survey (~ 600 hours of telescope time) in the 1.3, 2, 3, 7, and 13 mm bands confirm the low molecular content in this kind of sources. This fact is significant in those sources where the disk is the dominant component of the nebula. Additionally, we classify the Red Rectangle, AI Canis Minoris, IRAS 20056+1834, and R Scuti as O-rich, while 89 Herculis presents a C-rich environment.

My poster is available at https://zenodo.org/record/6984936