

Molecules from evolved stars and their role in the cycle of the ISM

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The ejecta of evolved stars are excellent chemical laboratories where a large variety of molecules is formed in situ. Molecules are detected in the circumstellar material of almost every type of evolved star, no matter if it is a low-mass or massive star. However, the largest amount and variety is found in the nearly isotropic expanding envelopes around AGB stars. The gentle stellar wind developed during this phase possesses ideal conditions to trigger the formation of molecules and dust particles.

Recent times are seeing a significant progress in the study of the molecules in AGB envelopes. On the one hand, the increased frequency coverage and the improved sensitivity of radio and infrared telescopes is allowing to discover new circumstellar molecules. On the other, the order-of-magnitude enhancement in spatial resolution of ALMA and NOEMA are making possible to pinpoint the exact chemical origin of each type of molecule in these environments.

In this talk I will review the status of our knowledge concerning molecules around evolved stars, with a focus on the high-spatial resolution view of the chemistry in the innermost regions of AGB envelopes. These regions, where dust grains are formed and the wind is accelerated, have been largely unexplored and are starting to be accessed thanks to ALMA and NOEMA. I will present recent observational results, review the successes and failures of theoretical models to explain the molecular composition in these inner regions, and comment on the prospects for the future.