Abstract for S03 : Atelier général de l'Action Thématique Physique Stellaire

Title: Molecular formation the innermost region of O-rich and C-rich AGB stars

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Evolved cool stars are important in the recycling of matter in the universe. They provide strong mechanical, chemical, and radiative feedback on their host environment. depends heavily on whether the elemental C/O ratio at the stellar surface is below or above unity. Typically, molecules in circumstellar envelopes are formed at the stellar atmosphere under chemical equilibrium or in the outer expanding layers due to the action of photochemistry. The presence of most of the molecules detected is relatively well understood. However, there are a few molecules for which their origin is not clear at all. For example, because of the presence of H2O and PH3 in the inner regions of C-rich envelopes, abundances can vary by a few orders of magnitude above the predictions from chemical equilibrium. This is also observed in O-rich stars, where the abundances of HCN, CS, and NH3 are more important than expected. We want to compare the abundance of a sample of molecules in C and O-rich stars, to reveal the differences between the equilibrium chemistry and the observations. Such study allows us to add more constraints on the models to reproduce those unexpected values. The differences can be explained by non-equilibrium chemistry such as shocks or UV photons which are not taken into accounts in classic models. In this talk, I will present the results of radiative transfer models constructed to reproduce high angular resolution ALMA observations to understand where and how molecules form around AGB stars.