SEMINAIRE ISMO

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Interstellar Aromatic Chemistry

Aromatic hydrocarbon molecules such as benzene (c-C6H6) demonstrate peculiar thermodynamic stability and chemical inertness. Thus, aromatic species are expected to be relatively prevalent in the interstellar medium - mainly in the form of polycyclic aromatic hydrocarbons (PAH) - where they are able to survive the harsh environments dominated by shocks and radiation. In spite of chemical intuition, aromatic chemistry as a field of research in space has remained relatively elusive; no single PAH has been identified in space due to their broad and non-unique infrared absorption spectra, and smaller aromatics like benzene and naphthalene do not possess a permanent dipole moment, and are therefore invisible in the radio.

The recent discovery of benzonitrile (c-C_6H_5CN) - a polar analog of benzene - by McGuire and co-workers in the cold, dark molecular cloud TMC-1 with the 100 m Green Bank Telescope (GBT) has opened up a new avenue of interstellar chemistry, demonstrating derivatives of otherwise non-polar aromatic hydrocarbons can now be detected using radio-based methods, which have been the main workhorse for molecular astrophysics. The questions that we now seek to answer will extend the benzonitrile detection beyond novelty: how widespread is aromatic chemistry, and what role does it play in the chemical and physical dynamics of interstellar environments? In this talk, I will present the combined observational, laboratory, and theoretical efforts to answer these questions, all of which stem from two large GBT projects, ARKHAM and GOTHAM. I will discuss laboratory and theoretical studies into how aromatic rings may form under low-temperature conditions, and preliminary results from the large GBT observational campaigns.

Mardi 3 septembre 2019 à 11 h

Amphithéâtre du bât 520 (3ème étage)

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