High spatial resolution observations of key hydrocarbon species in the NGC 7023 PDR

P. Pilleri[1,2], C. Joblin[1,2], A. Fuente[3], M. Gerin[4], J. Pety[5], F. Boulanger[6], T. Onaka[7], F. Le Petit[8]

[1] *Université de Toulouse, UPS, IRAP, 9 av. du colonel Roche, 31062 Toulouse Cedex 4, France* [2]*CNRS, UMR5187, 31028 Toulouse, France*

[3] *Observatorio Astronomico Nacional. Alcalà de Henares (Madrid), Spain*

[4] *LERMA, Observatoire de Paris, 61 av. de l'Observatoire, 75014 Paris, France*

[5] *IRAM, 300 rue de la Piscine, 38406 Saint Martin d'Héres, France*

[6] *Institut d'Astrophysique Spatiale, 91405, Orsay, France*

[7] *University of Tokyo, 113-0033 Tokyo, Japan*

[8] *LUTH and UMR 8102, Observatoire de Paris, F 92190 Meudon, France*

Carbon is an important building block of both interstellar gas and dust in Photo-Dissociation Regions (PDRs). A significant fraction of carbon (up to 20%) is tied up in the carriers of the Aromatic Infrared Bands (AIB), which consist in Polycyclic Aromatic Hydrocarbons (PAH) and evaporating very small grains (eVSG) [1,2]. The nature of PAHs and eVSGs and their link with smaller hydrocarbons are still under debate, in particular their aliphatic/aromatic composition [3,4] and whether their photo-destruction can inject fresh hydrocarbons into the gas phase, which could explain why the abundances of small hydrocarbons (e.g., CCH and c-C_3H_2) in cool PDRs are one order of magnitudes higher than those predicted by current gas-phase chemical models [5].

In this contribution, we study the aromatic-aliphatic nature of PAH-related molecules and their link with gas phase chemistry by analyzing IR and radio observations of the NGC 7023 PDR at high angular resolution: the mid-IR Spitzer data allows us to study the evolution of the AIB carriers under the action of UV photons; AKARI near-IR observations provide information on the aromatic and aliphatic nature of PAHs and eVSGs; finally, mm-wave data obtained with the Plateau de Bure Interferometer and with the IRAM 30m telescope are used to investigate the chemical link of these species with gas-phase species CCH and c-C_3H_2.

Références

[1] Rapacioli et al., 2005. [2] Pilleri et al., 2012.
[3] Joblin et al., 1996. [4] Pino et al., 2008
[5] Pety et al., 2005.

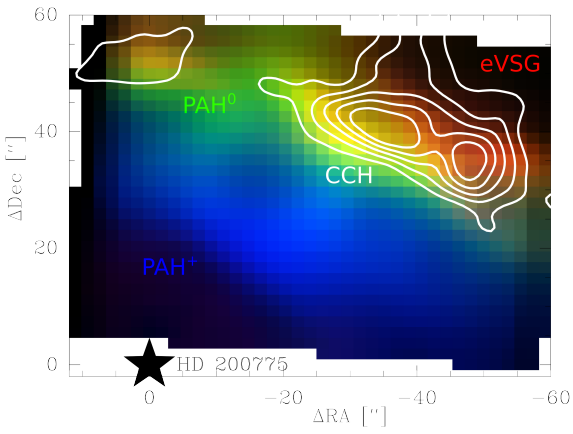

Figure 1: The NW PDR of NGC 7023 decomposed in PAH^+ (blue), PAH^0 (green) and eVSGs (red). Contours represent the integrated intensity of the CCH N=1-0 line (steps of 0.25K km s^{-1}).