THE NEWLY SET-UP SPECTROSCOPIC MOLECULAR BEAM APPARATUS: PRODUCING TRANSIENT MOLECULES IN A COLD SUPERSONIC JET

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Diffuse interstellar bands, or DIBs, are features in absorption spectra of astronomical objects. Probable carriers of those bands are various, yet unassigned molecules found in the visible and near-infrared sprectra of interstellar gas and dust clouds. Complex organic molecules may contribute to the DIBs as shown in recent work by Campbell *et al.* when they assigned some of the near-infrared DIBs to the molecular ion C_{60}^+.[1] To assign more DIBs, laboratory experiments are required. Therefore, it is necessary to employ a powerful source which is capable of producing astrochemically relevant molecules coupled with high resolution spectroscopy.

The Even-Lavie high-pressure pulsed valve provides a supersonic jet with cooling properties below 1 K, backing pressures up to 100 bars, repetition rates up to 600 Hz and gas pulse widths of 20 microseconds.[2] Together with a mountable AC discharge source it is capable of producing both stable and transient molecules in a jet to approach the production of astrochemically relevant species.

Here we present preliminary data from a molecular beam setup coupled with a discharge source and REMPI spectroscopy as the detection technique.

[1] doi:10.1038/nature14566, E. Campbell, M. Holz, D. Gerlich et al., "Laboratory confirmation of C_{60}^+ as the carrier of two diffuse interstellar bands", Nature **523**, 322-323 (2015).

[2] doi:10.1063/1.481405, U. Even, J. Jortner, D. Noy, N. Lavie, C. Cossart-Magos, "Cooling of large molecules below 1 K and He clusters formation", J. Chem. Phys. 8 May 2000; 112 (18): 8068-8071.

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