

JWST observations of the interstellar medium

Authors: Meriem Elyajouri, Ilane Schroetter, ERS pdr4all team, GTO team

Abstract:

Much of the emission observed with the James Webb Space Telescope (JWST) will come from photon-dominated regions (PDRs), the interfaces where molecular clouds are exposed to radiation from massive stars. Understanding PDR emission is essential, as it traces star formation and provides a major insight into the physical conditions in star forming regions, as well as the radiative feedback processes regulating galaxy evolution.

Within JWST planned projects, particularly promising are the Early Release Science (ERS) program “PDRs4All” (Berné, Habart, Peeters et al. PASP 2022) and the Guaranteed Time program “Physics and Chemistry of PDR Fronts” (P.I. Karl Misselt, French co-Is Alain Abergel, and Pierre Guillard) that will obtain the first spatially resolved, high spectral resolution observations at near and mid-IR wavelengths of three nearby emblematic PDRs: the Orion Bar, the Horsehead and NGC 7023. These programs, in which IRAP and IAS data reduction teams are strongly involved (with support of the French MIRI center of expertise), will extensively use the spectro-imagery capabilities of MIRI, NIRCam and NIRSpec. These observations will provide template datasets designed to identify key PDR characteristics in JWST observations and serve to benchmark PDR and dust models and extend them into the JWST era. These template datasets and Science-Enabling products will guide the preparation of future proposals on star-forming regions in our Galaxy and beyond and will facilitate data analysis and interpretation of forthcoming JWST observations.

Ref Berné, O., Habart, E., Peeters, E. and the PDRs4All team PASP 2022 accepted arXiv:2201.05112