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3D EXTINCTION MAPS OF THE MILKY WAY SOLAR NEIGHBOURHOOD WITH GAIA GSP-SPEC

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Abstract.

Understanding the structure of the Milky Way is a challenging study because of the mix between stars and dust distributed inhomogeneously thought the halo, the disc, and the bulge. The interstellar extinction caused by the dust presents along the entire line of sight, affects the light coming from stars, which becomes fainter and redder misrepresenting the absolute magnitude and intrinsic colours of stars. Mapping the extinction is a serious challenge in order to provide access to the distribution of this dust, especially for the low Galactic latitude disc regions. In fact, high-dust density areas are expected to be associated with high star formation regions. This study of extinction distribution in the Galactic disc is thus a way to demystify the spatial structure of the disc and interpret the observations.

In Barbillon et al. (in prep), we present new 2D and 3D extinction maps derived from the last DR3 of Gaia GSP-Spec spectroscopic survey including high-quality astrometric parameters. This catalogue initially composed of 5.6 million sources presents the advantage of estimating the effective temperature T_{eff} not affected by the extinction. The created 2D dustmaps illustrate the full extinction distribution of the RVS catalogue in the Milky Way, while the 3D maps highlight the dust structures around the Solar vicinity that extends out to 2 kpc with a focus around the Local Bubble (extends out to 500 pc). Our extinction catalogue with robust and small extinction uncertainties is in good agreement with existing 2D and 3D extinction maps (Schlegel et al. 1998; Green et al. 2019; Vergely et al. 2022; Edenhofer et al. 2024; Dharmawardena et al. 2024), etc., improved by the only use of one survey that avoids the use of priors or likelihood split into the probability of the estimated extinction. The general agreement between this work and the literature is in proving the reliability of this new extinction measurement in the Gaia *Bp* and *Rp* bands.

Finally, the new 2D and 3D extinction maps allow us to link constraints on interstellar medium structure in the Sun vicinity (through the dust), stellar chemistry (Poggio et al. 2022; Barbillon et al. 2025), and stellar density (Poggio et al. 2021; Palicio et al. 2023).

Keywords: Galaxy: structure, disc, solar neighbourhood - ISM: structure, clouds, dust, extinction

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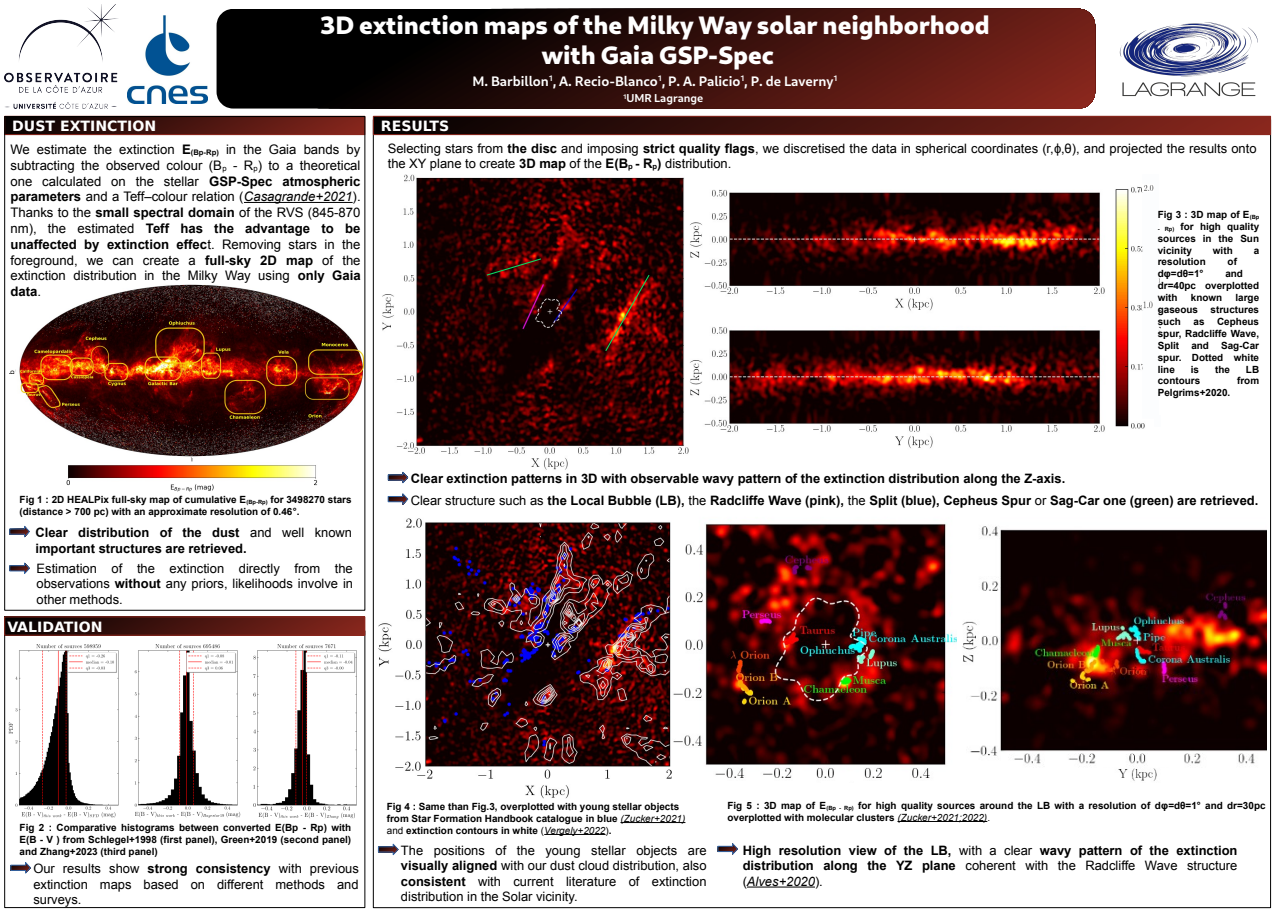

Fig. 1. Poster of my work about extinction maps of the Milky Way using *Gaia GSP-Spec* data.

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