Estimating the dust-heating interstellar radiation field in nearby galaxies using the PHANGS MUSE+JWST+ASTROSAT surveys

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The PHANGS JWST Cycle 1 and 2 Treasury programs have mapped the near- and mid-infrared emission across the disks of 19 nearby (d<20Mpc) galaxies, including bands thought to be dominated by the emission from small interstellar dust grains and polycyclic aromatic hydrocarbons (PAHs). A physical interpretation of these new data requires robust knowledge of both the intensity and hardness (i.e. spectral shape) of the dust-heating interstellar radiation field (ISRF) at UV-optical wavelengths.

In this contribution, I will present the method that we have developed to build an empirically motivated model of the ISRF at ~100 pc scales for galaxies in the PHANGS sample, rather than assuming the ISRF in the solar neighborhood. Our approach combines the PHANGS MUSE and ASTROSAT survey data with the Bruzual & Charlot 2003 simple stellar population (SSP) templates. We use the resulting local ISRFs and the DustEM code to model the observed JWST+Herschel infrared spectral energy distribution (SED) in each region and map the PAH and small dust grain abundance across each galaxy.

I will illustrate the method and present our results for the galaxy NGC0628 (Maris et al. in prep 2025). I will also show that this new method allows us to use the stellar emission prediction and the data to map the UV-VIS extinction and I will show that we observe for the first time a relationship between the ionised PAH abundance and extinction.