

Analysis of the Interstellar Medium Properties of the *Herschel* Reference Survey Galaxies

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Abstract. The *Herschel* Reference Survey is a guaranteed time key project aimed at studying the physical properties of the interstellar medium (ISM) of 323 nearby galaxies, covered by multi-wavelength data. This volume limited, K-band selected sample is composed of galaxies spanning the whole range of morphological types and environments. We conduct a statistical study on the ISM properties of nearby galaxies based on the analysis of their SED. To achieve this goal, we fit the data with the models of Draine & Li (2007) to obtain the intensity of interstellar radiation field, the PAH abundance, the contribution of photodissociation regions, and the dust mass.

Keywords. galaxies: ISM

Dust plays an important role in the interstellar medium as it acts as a catalyst in the transformation process of the atomic to molecular hydrogen, shields the UV radiation field preventing the dissociation of molecular clouds, and contributes to the cooling and heating of the ISM in photodissociation regions (Wolfire *et al.* 1995). It is thus important to understand the relations between the dust properties and those of the galaxy.

We select galaxies from the HRS (Boselli *et al.* 2010, Ciesla *et al.* 2012 for the *Herschel* photometry) with a sufficient infrared emission once the stellar contribution has been properly removed. Almost all of them are late-type galaxies, with a few lenticulars. We study the relations between outputs from infrared SED fitting using the dust emission models of Draine & Li (2007) and the integral physical properties of galaxies such as the stellar mass (M_*), the specific star formation rate ($sSFR$), the metallicity or the morphological type (Ciesla *et al.* 2013, in prep). Preliminary results confirm the correlation between the fraction of PAH emission with the SFR and the metallicity and show a correlation with the stellar mass. There seem to be some trends between the diffuse interstellar radiation field and the $H\alpha$ surface brightness, the H surface brightness tracing the diffuse interstellar component and the attenuation in the FUV band.

References

- Boselli, A., Eales, S., Cortese *et al.* 2010, *PASP*, 122, 261B
Ciesla, L., Boselli, A., Smith, M. W. L. *et al.* 2012, *A&A*, 543, A161
Draine, B. T. & Li, A. 2007, *ApJ*, 657, 810-837
Wolfire, M. G., Hollenbach, D., McKee, C. F. *et al.* 1995, *ApJ*, 443, 152W