Variations of the Dust Properties in the Magellanic Clouds, Using *Herschel* and *Spitzer* Observations

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The properties of interstellar dust (chemical composition, size distribution, etc.) depend on the local environmental conditions, and on the elemental enrichment history of the galaxy. However, the individual processes controlling this evolution (dust production by stars, dust growth in the ISM, dust destruction by shocks, etc.) are not known accurately enough to unambiguously model the evolution of galaxies. One of the ways to refine our knowledge of these evolutionary processes consists in studying the variations of local observed dust properties, measured via their spectral energy distribution (SED), as a function of the local physical conditions (gas density, temperature, metallicity, etc.). These trends between dust properties and physical conditions are valuable constraints on the nature and efficiency of the grain evolutionary processes.

The Large and Small Magellanic Clouds (LMC & SMC) are particularly relevant environments to address these questions, as their metallicity is sub-solar (1/2 and 1/6 solar for the LMC and SMC respectively), and they exhibit large gradients of physical conditions, from massive star formation to quiescent regions. Their proximity (50–60 kpc), allows us to resolve the ISM on parsec scale, in the far-infrared.

In this talk, I will first review several recent studies of the Magellanic clouds, with *Herschel*, *Planck* and *Spitzer*. I will then present the results of an ongoing project aimed at modelling in details the near-IR-to-submm emission of a sample of star forming regions. This modelling is done using a new hierarchical Bayesian SED model, efficient at removing the numerous biases inherent to this type of model. I will discuss our results concerning: *(i)* the constraints on the general grain emissivity; *(ii)* the variation of the aromtic features throughout different environments; *(iii)* the ambiguity between accretion of material in dense regions and the massive presence of CO-free molecular gas (the so-called "*dark gas*").