Direction des Sciences de la Matière
IRFU
Service d'Astrophysique

## Soutenance de thèse du Service d'Astrophysique

# PHYSICAL PROCESSES IN THE INTERSTELLAR MEDIUM OF THE MAGELLANIC CLOUDS

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SAp

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The interstellar medium (ISM) plays a major role in galaxy evolution. Feedback from stars, in particular, drives several processes responsible for the global properties of a galaxy. However, the efficiency of these processes is related to the properties and structure of the different gas and dust ISM phases and remains uncertain.

Due to the increased sensitivity and resolution of the new far-infrared (FIR) and submillimeter facilities (such as the Herschel Space Observatory, SOFIA and ALMA, in particular), it now becomes possible to study in detail the interplay between star formation and the surrounding ISM phases. This work focuses on the physical properties of the gas in the Magellanic Clouds. The Large Magellanic Cloud and the Small Magellanic Cloud, our closest neighbors, both at subsolar metallicity, are good laboratories to study the interaction between star formation and environment. The 30 Doradus region, in the Large Magellanic Cloud, one of the most massive and active star forming region known in our neighborhood, is first studied in detail. We use the FIR and mid-infrared tracers, provided by the space telescopes Herschel and Spitzer, to bring constrains on the pressure, radiation field and 3D structure of the photo-dissociation regions (PDR) in this extreme region, using the Meudon PDR code. This modeling allows us to estimate the fraction of molecular gas not traced by CO, also known as the "CO-dark" molecular gas.

We apply this method to other star forming regions of the Magellanic Clouds, which are characterized by different environmental conditions. Our study allows us to evaluate key diagnostics of the gas heating and cooling of low metallicity resolved starburst regions. This is a first step toward understanding similar but unresolved regions, in high-redshift galaxies.