

Institut de recherche sur les lois fondamentales de l'univers  
SOUTENANCE DE THÈSE

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Mercredi 07/10/2015, 14h30-15h30

CEA Saclay, Orme des Merisiers Bat 713, salle de séminaires Galilée

A STATISTICAL AND MULTI-WAVELENGTH STUDY  
OF STAR FORMATION IN GALAXIES

**SCHREIBER Corentin**

SAP

During the last fifteen years, the development of infrared astronomy through the satellites ISO, IRAS, Spitzer and Herschel has revolutionized our conception of galaxy evolution. By observing the light emitted by the interstellar dust, these observatories allow us to detect the energy and matter that remain elusive to the best optical telescopes, and have thereby discovered a substantial yet unexpected part of the star formation activity of galaxies.

In particular, I will present the new results I have obtained using the last data acquired by the Herschel satellite. Using several thousands of galaxies at different epochs of the Universe, I bring forward the best constraints available today on the properties of the "Main Sequence" of star-forming galaxies. The existence of this sequence is a key to understand galaxy evolution: its small scatter suggests that the majority of galaxies are growing through long and steady episodes of star formation, rather than intense bursts like those triggered by the collision of two galaxies. I show in particular that more than two thirds of the mass of stars present in the Universe today has been formed within Main Sequence galaxies, hence that this is the dominant mode of galaxy growth.

In the mean time, I observe that the most massive galaxies are experiencing a strong decline of their star formation activity, and study the various possible causes for this evolution. By quantifying their gas reservoirs, I find that this phenomenon can be mainly attributed to a decrease of the efficiency of gas conversion into stars, rather than by a lack of such gas.

Lastly, I introduce some preliminary results on star formation in the young Universe ( $z=4$ ) obtained with the ALMA telescope. I describe in particular the resulting new constraints on the Main Sequence at this epoch, and present two extremely distant galaxies that could be the most massive and most dusty ever detected in a Universe that is less than a billion years old.

After the defense, a cocktail will be served in the Cassini room (709, ground floor).

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