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Star Formation at large scales with Euclid and Simulations

The cosmic infrared background (CIB) is composed of the combined diffuse infrared emission from dusty star-forming galaxies. Thus, it is a tracer of the star formation history of galaxies at all redshifts, peaking at cosmic noon. Correlations between the CIB and other large-scale cosmological probes are powerful tools to infer constraints on the star formation rate of galaxies in the cosmic web.

Cross-correlations between the CIB and galaxy number-counts have been proven to measure the bias-weighted star-formation rate density bρSFR in redshift bins in a model independent way (Jego et al. (2023a)), which imposes constraints on various SFR model parameters. Jego et al. (2023b) proposes an extension of this work, showing how CIB and weak lensing cross-correlations can improve such constraints.

Euclid is opening unprecedented perspectives to study the CIB in cross-correlation. The galaxy lensing will allow a tomography of the link between the mass distribution probed by lensing and the star-formation probed by the CIB. This should be a much direct probe of the distribution of the star formation into the large-scale structure of the universe at various cosmic times. We propose to measure this signal using the Euclid DR1 weak lensing data and the ancillary Planck and Herschel CIB maps. The growth in sensitivity and area enabled by these data will vastly increase the significance of the CIB-shear signal, and the range of scales over which it can be effectively employed. Thus, this talk aims at presenting the previous relevant works that lay the ground for our CIB-Euclid studies, and our ambitions for Euclid DR1, completed by studies of the link between star-formation and the cosmic web in simulations like SIMBA.