High redshift galaxies in the EAGLE suite of simulations

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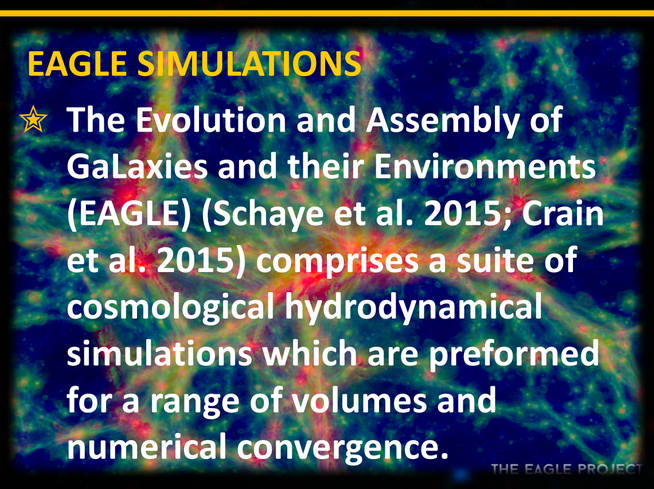
EAGLE SIMULATIONS

- The Evolution and Assembly of GaLaxies and their Environments (EAGLE) (Schaye et al. 2015; Crain et al. 2015) comprises a suite of cosmological hydrodynamical simulations which are preformed for a range of volumes and numerical convergence.



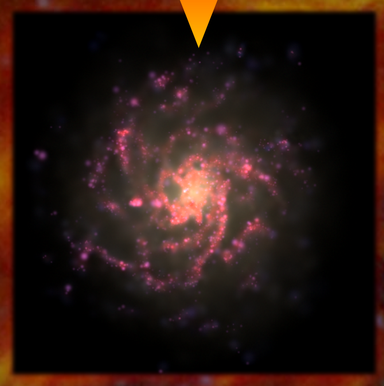
SKIRT SOFTWARE CODE

- SKIRT is a Monte Carlo radiative transfer code (Baes+ 2011, Camps+ 2015).
- It has been particularly designed to model the interaction between starlight and interstellar dust grains within galaxies. It properly treats absorption and multiple anisotropic scattering by the dust.

PREVIOUS WORK

- Previously Camps+ 2016, Trayford+ 2017 developed a procedure to calculate dust-attenuated and dust emission fluxes for EAGLE galaxies, using the SKIRT code.
- They compared the results for a selection of simulated galaxies with observations in the Local Universe, finding good agreement in many areas.

Optical



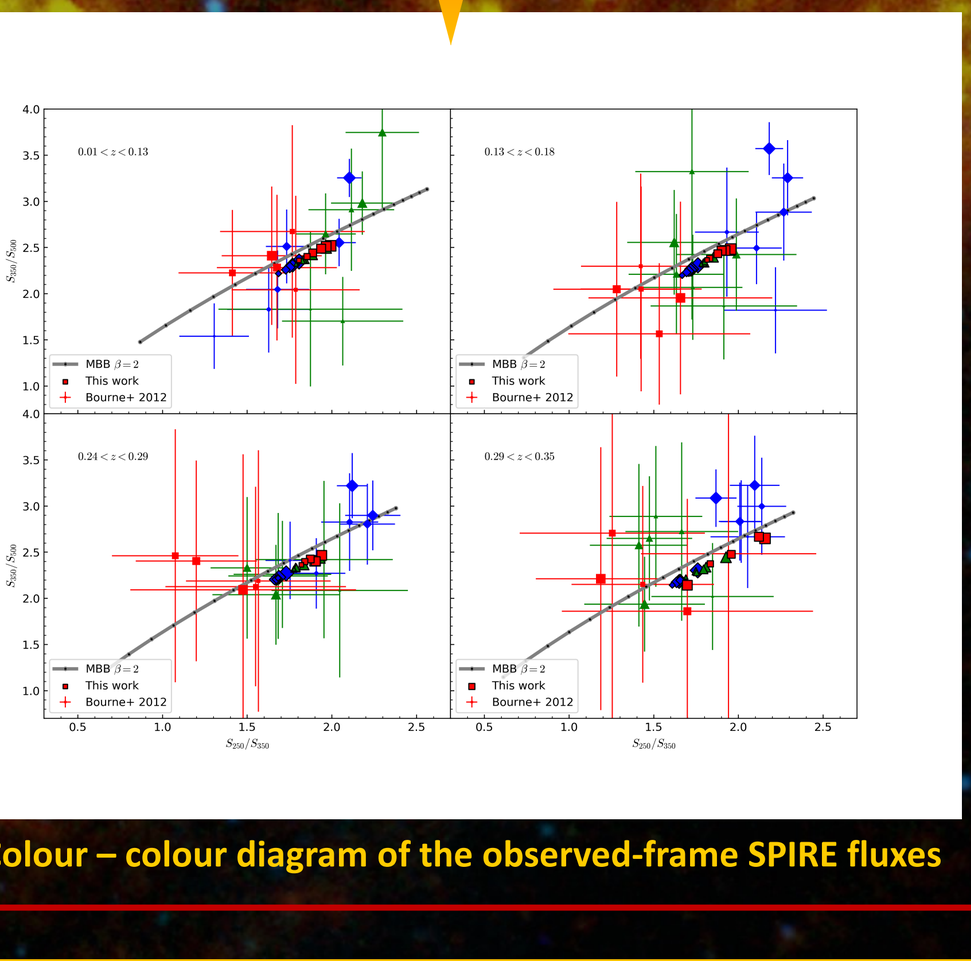
Optical + IR

H-ATLAS

- The Herschel Astrophysical Terahertz Large Area Survey (H-ATLAS; Eales et al. 2010b) is large area submm sky survey.
- It is the largest open-time key project on the Herschel Space Observatory and surveyed 550 deg2 in five channels centred on 100, 160, 250, 350 and 500 μm, using the PACS and SPIRE instruments.

PROJECT GOAL

- Employing the same post-processing procedure, we now have calculated dust-attenuated and dust emission fluxes in a wavelength range from UV to sub-mm for about 500 000 sufficiently resolved EAGLE galaxies at various redshifts up to z=6.
- We will compare EAGLE with H-ATLAS up to z=0.5. More specifically, we will attempt to reproduce the evolution of a number of properties of the galaxy population, for both optically and submm selected samples.



Colour – colour diagram of the observed-frame SPIRE fluxes

FIRST RESULTS

- The plot is divided into four different redshift bins.
- Data are divided into three $g - r$ colour bins (different symbol shapes and colours) and six M_r bins (different symbol size: larger=brighter).
- Grey curve traces a modified black body with $\beta = 2$.
- All our data points are slightly below the $\beta = 2$ curve, which is expected due to temperature stratification.
- All the data points form a tight sequence, whereas the observational data points show much more scatter. Part of it is observational scatter in the observed data points, part can be due to the fact that the dust in all our galaxies is identical.
- Red galaxies have stronger color gradients than blue galaxies. This trend not evident in the observed data from Bourne et al. (2012) but is seen in other nearby galaxies, in the Herschel Reference Survey: on average, the dust in early-type galaxies is warmer than in late-type galaxies (Cortese et al. 2014).

Want to know more? Contact me at Ana.Trcka@Ugent.be