The Herschel view of the dominant mode of galaxy growth from z = 4 to the present day & my contribution to ASTRODEEP!

> **Corentin Schreiber** Maurilio Pannella, David Elbaz, Matthieu Béthermin, Hanae Inami, et al., *January 29th 2015*



The Main Sequence of star-forming galaxies

The Main Sequence of star-forming galaxies Is it real?



correcting for dust attenuation is a challenging task

The Main Sequence of star-forming galaxies Is it real? And should we care?



are formed?

correcting for dust attenuation is a challenging task

The Herschel view of the dominant mode of galaxy growth

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The sample Herschel deep fields



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The sample Herschel deep fields, UVJ selection



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The sample Herschel deep fields, UVJ selection

UV, optical and NIR broad bands SED fitting: \rightarrow stellar mass (M_{\star}) and redshift (z) NUV+FIR broad bands: \rightarrow star formation rate (SFR) CANDELS: 0 < z < 523 000 H-band galaxies (H < 26) 3500 Herschel detections

selecting star-forming galaxies



The Herschel view of the dominant mode of galaxy growth

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With detections, stacked SFR



With detections, stacked SFR



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With detections, stacked SFR and stacked dispersion (scatter stacking)



With detections, stacked SFR and stacked dispersion (scatter stacking)



The SFR – M_{\star} main sequence: what about z = 4?

With detections, stacked SFR and stacked dispersion (scatter stacking)



The challenge of studying z > 3 galaxies

Getting robust redshifts



GOODS-South

The challenge of studying z > 3 galaxies

Getting robust redshifts



The challenge of studying z > 3 galaxies

Getting robust redshifts



GOODS-South

- VANDELS: 2500h @ VIMOS, 1000h to target LBGs down to H < 27 → will definitely help!
- But NIR spectroscopy needed to detect massive & obscured galaxies → 20h @ KMOS, 40 non-LBG z ~ 3 massive galaxies.

ASTRODEEP

ASTRODEEP: Mocking a cosmological deep field Consistent from the optical to the FIR



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Bivariate stellar mass & redshift distributions



Bivariate stellar mass & redshift distributions



Mass functions are fit with double Schechter laws. \rightarrow can generate redshift and mass catalogs down to dwarf galaxies.

UVJ colors

(U - V)_{rest,AB}



Accurate flux distributions in the optical-NIR



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ASTRODEEP: Mocking a cosmological deep field *Stacked Herschel SEDs*



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Accurate pixel distributions in the FIR



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Features:

- can produce arbitrarily large volumes,
- covers all wavelengths from the UV to the FIR,
- ... in a consistent way (realistic SEDs),
- basic clustering is implemented.

What's missing:

- stars,
- complex morphologies (spiral arms, clumps, mergers, ...),
- true clusters, with BCGs etc.,
- dependence of properties on environment (e.g. passive %),
- ...
- it's a mock catalog, not a simulation.