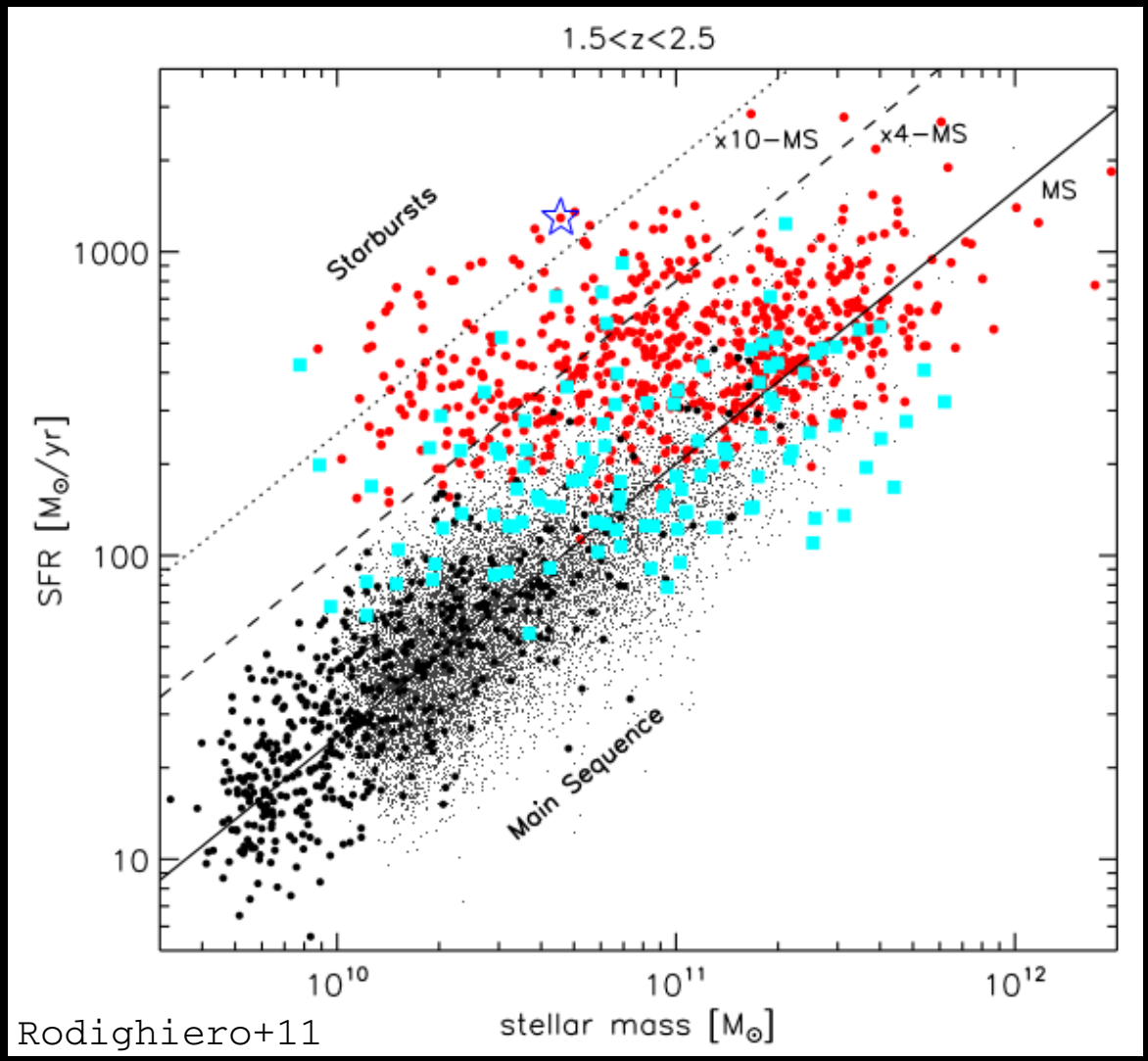
FMOS unveils the optical properties of z~1.6 *Herschel* dusty starbursts

Annagrazia Puglisi
E. Daddi, A. Renzini, G. Rodighiero, J.D. Silverman,
D. Kashino, A. Calabrò et. al

Emission Line Galaxies with MOS
18th September 2017, Kavli Institute for Cosmology, Cambridge

Star Forming Galaxies on and off the Main Sequence



Hot questions:

- What are the ISM conditions of high-z SFGs?
- What bring galaxies above the MS?

Emission lines studies

Spec-z
SFRs
Dust attenuation
Metallicity
Ionization
AGN

The FMOS-COSMOS survey at the Subaru Telescope

(Silverman+15b)

~5000 spectra $1.4 < z < 1.7$

H-long (λ ~ 1.6 - 1.8 μm)

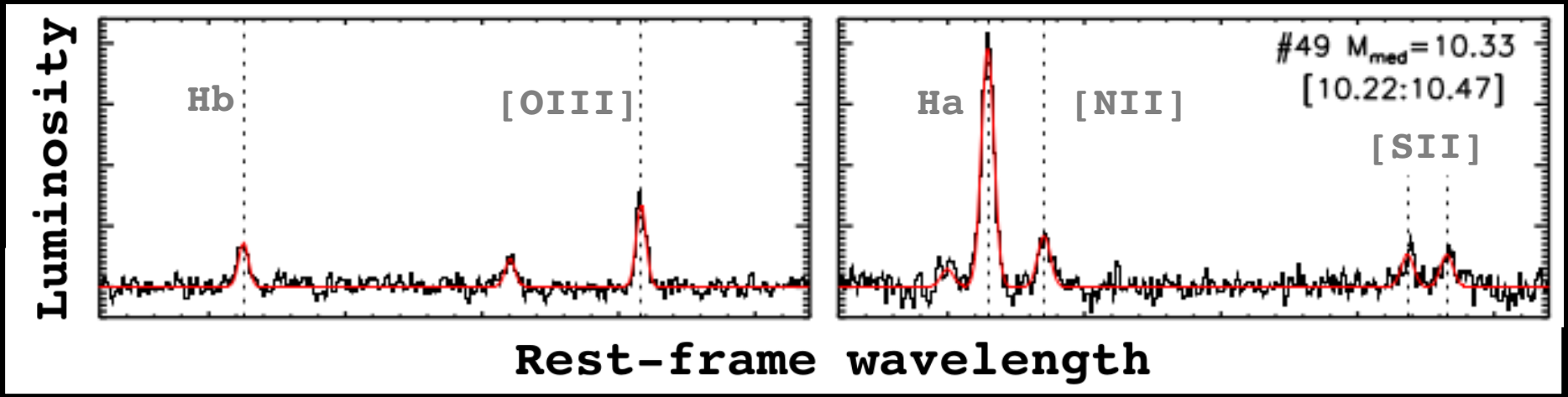
- Ha, [NII], [SII]

J-long (λ ~ 1.15 - 1.35 μm)

- Hb, [OIII]5007

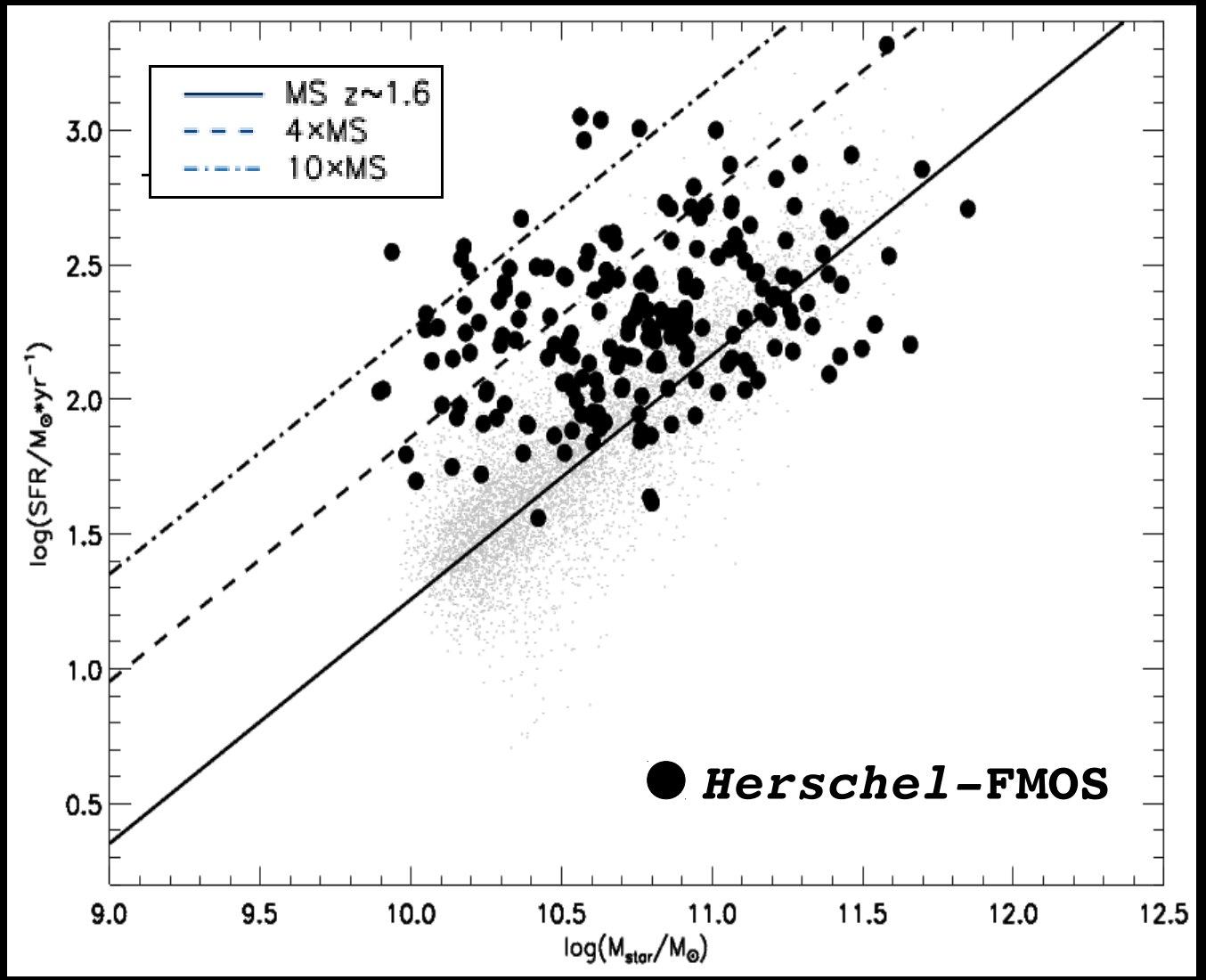
Detailed physical characterization Of z~1.6 <SFGs>

Kashino+13; +AP17a;Zahid+14b […]



The FMOS-COSMOS survey: focusing on dusty sources

- *Herschel*-PACS selection λ~100/160 μm (Lutz+11)
- 220 galaxies



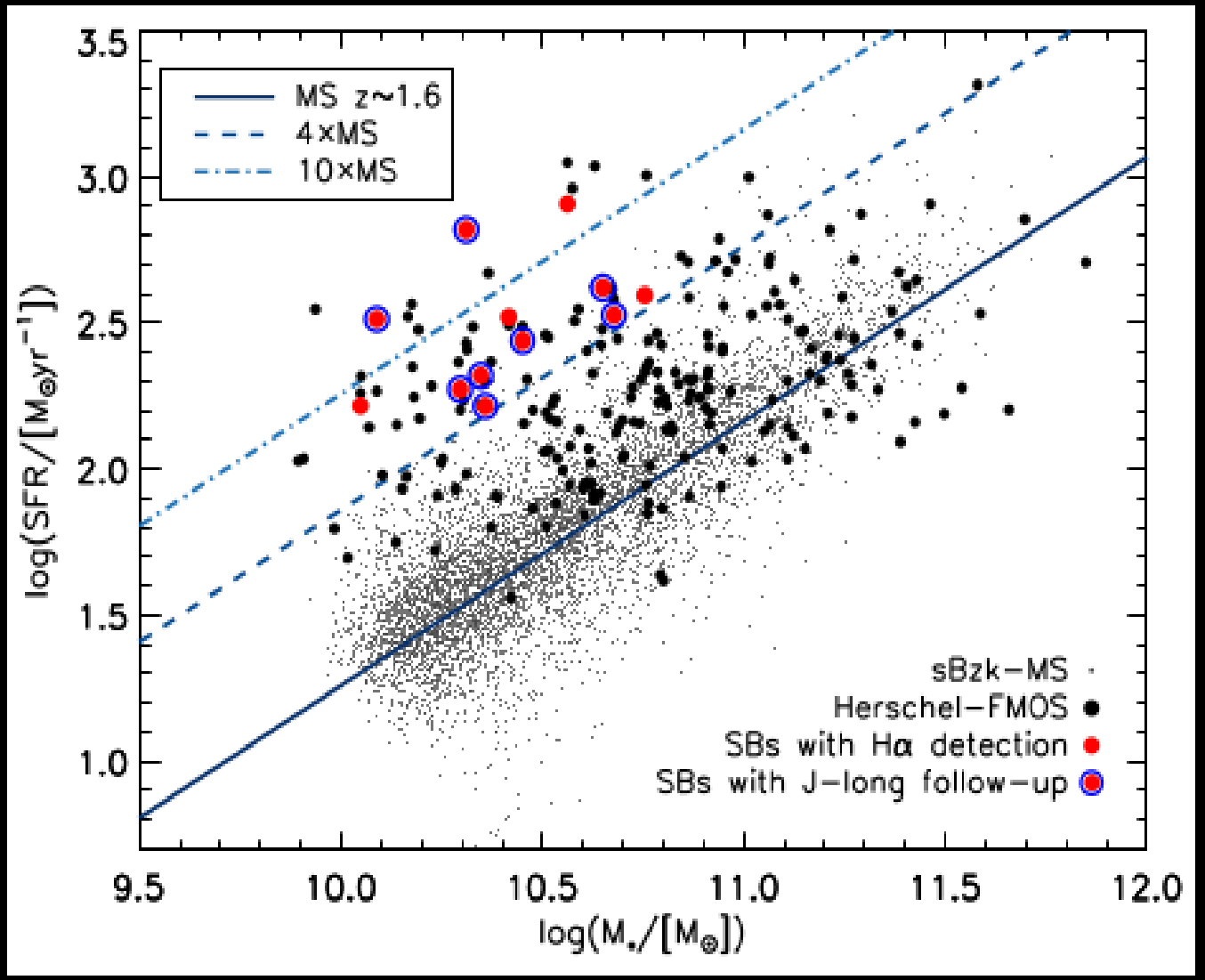
The FMOS-COSMOS survey: MS outliers at z~1.6

A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18

12 objects

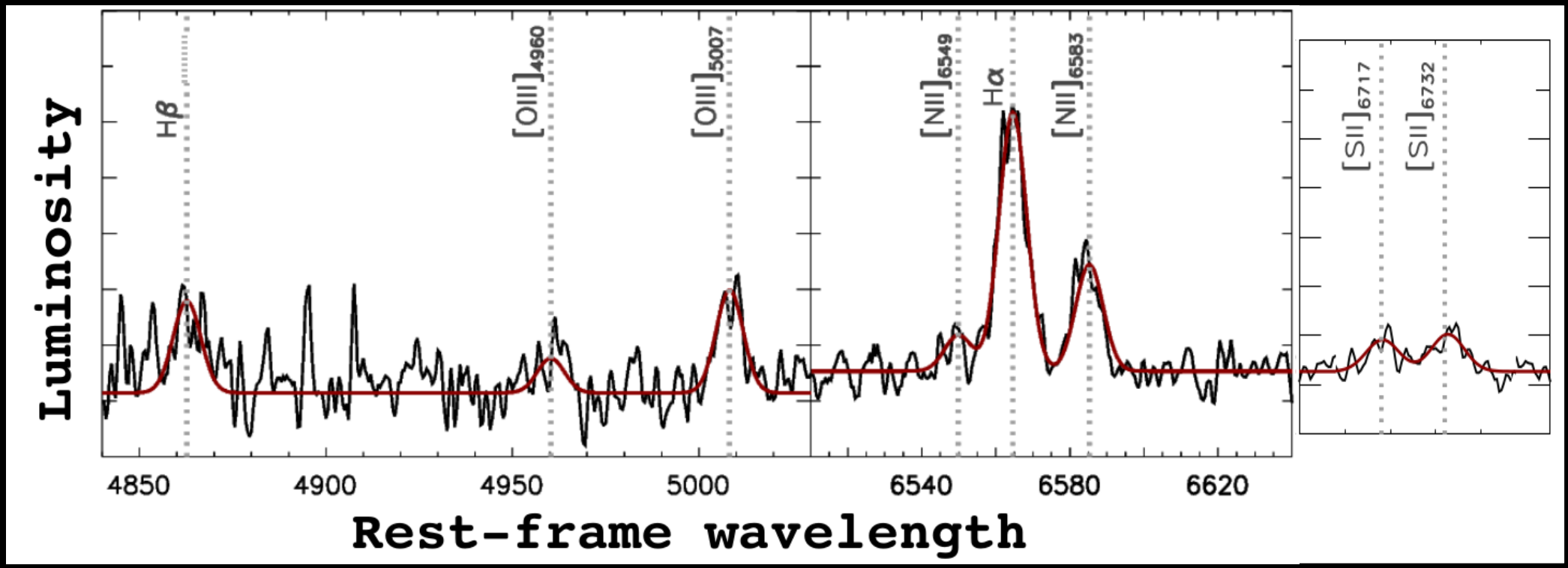
<SFR> ~ 8xSFR$_{MS}$

M_*/M_{sun} ~10.5



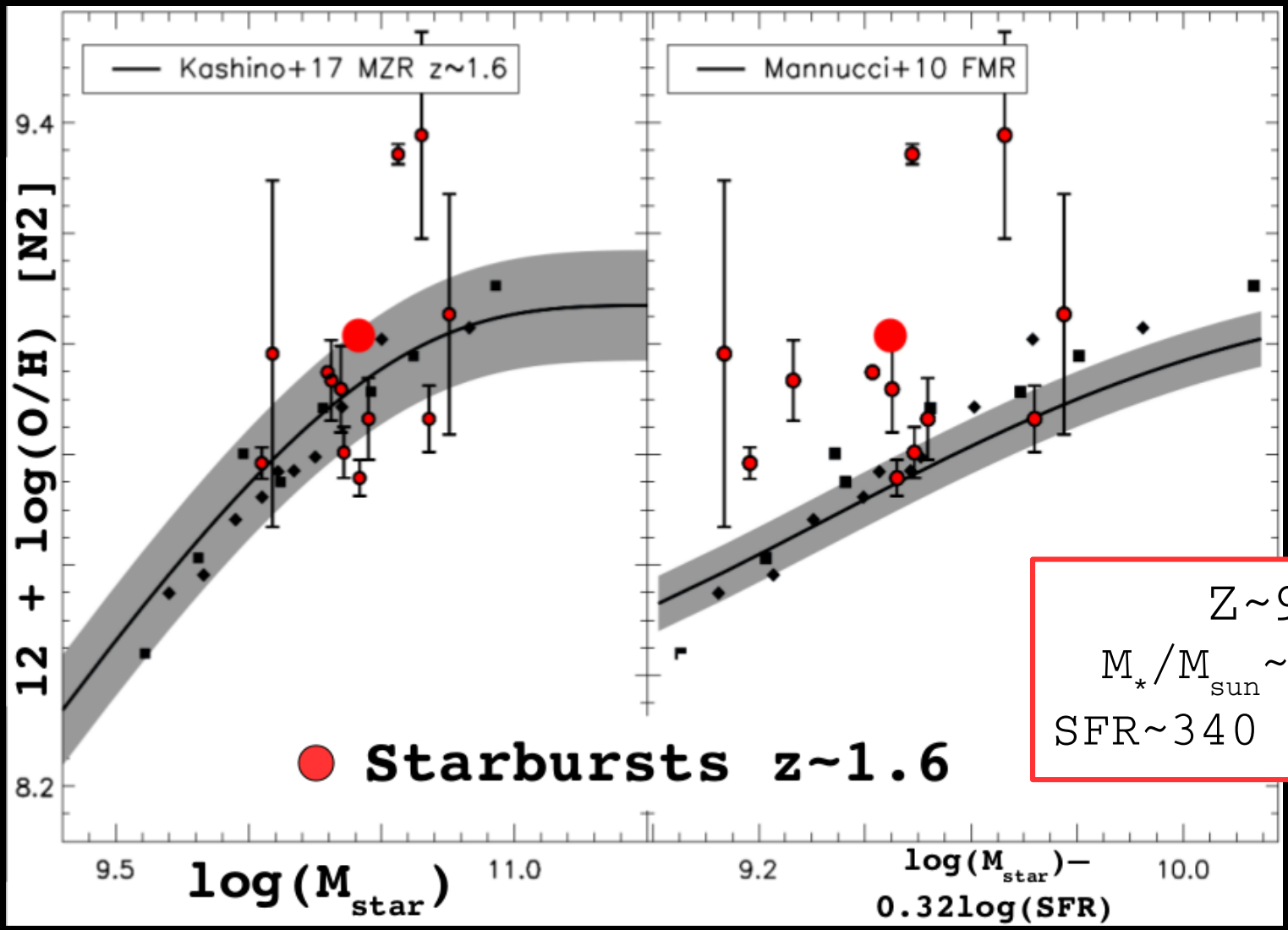
The FMOS-COSMOS survey: MS outliers at z~1.6

A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18



MS outliers at z~1.6: gas-phase metallicity

A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18



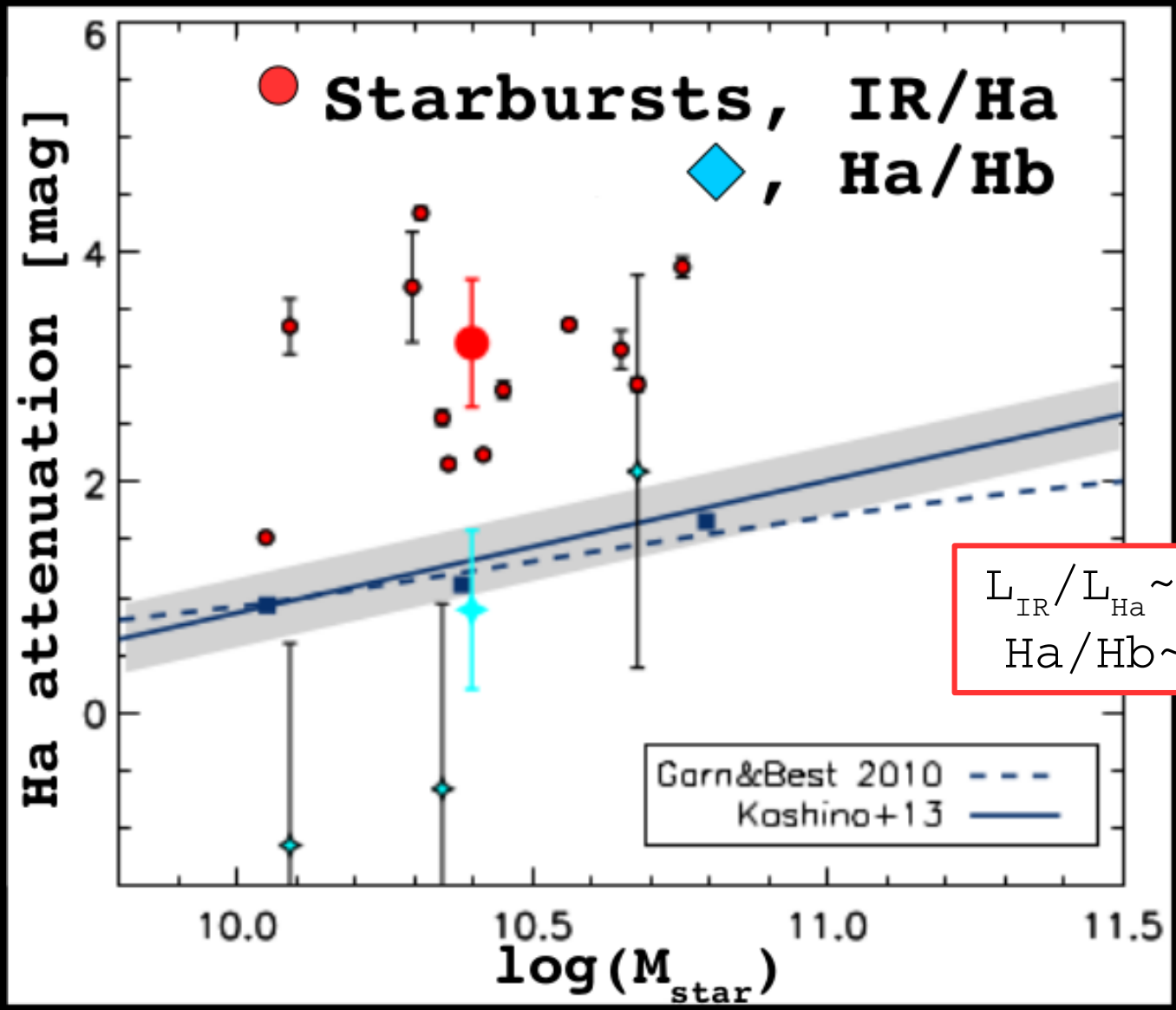
Z~9

M_*/M_{sun}~10.5

SFR~340 M_{sun}/yr

MS outliers at z~1.6: Ha dust attenuation

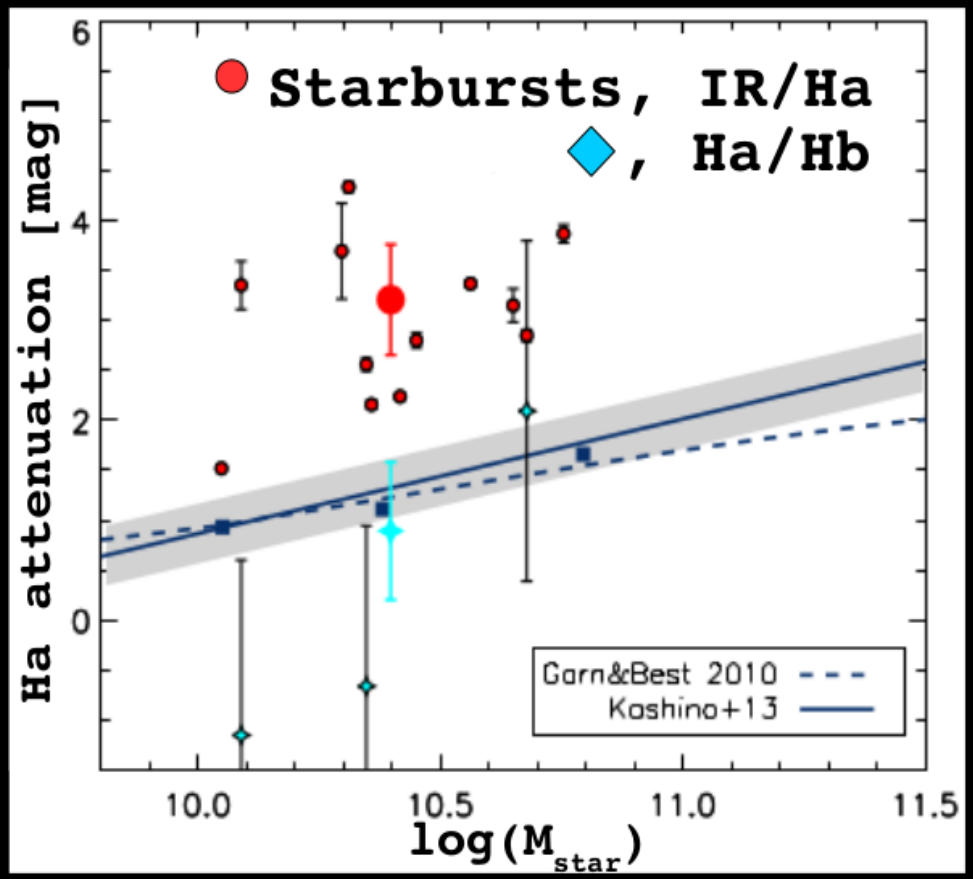
A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18

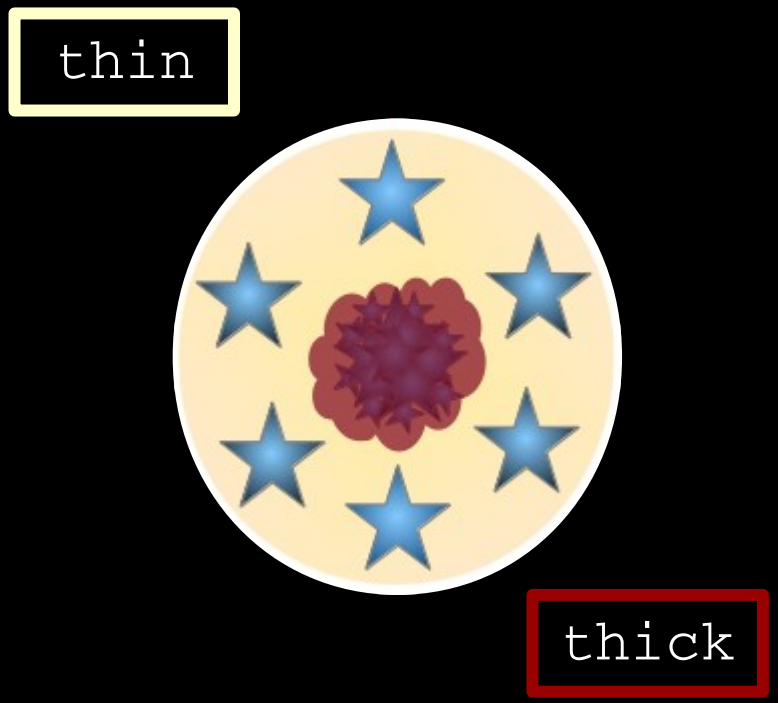


L_{IR}/L_{Ha}~3.3 mag
Ha/Hb~0.9 mag

"Decoupling" of optical/far-IR emitting regions

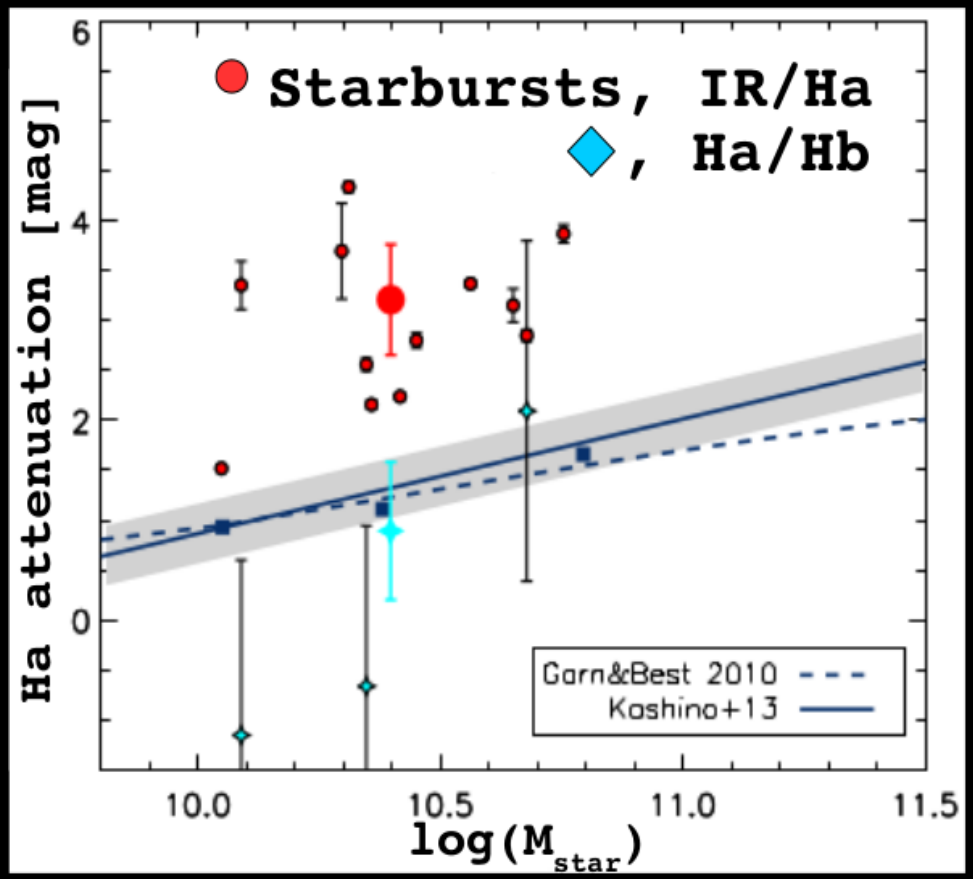
A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18



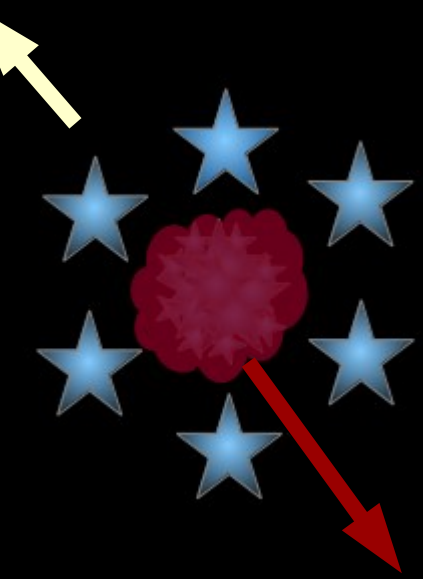


"Decoupling" of optical/far-IR emitting regions

A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18



FMOS (rest-optical)



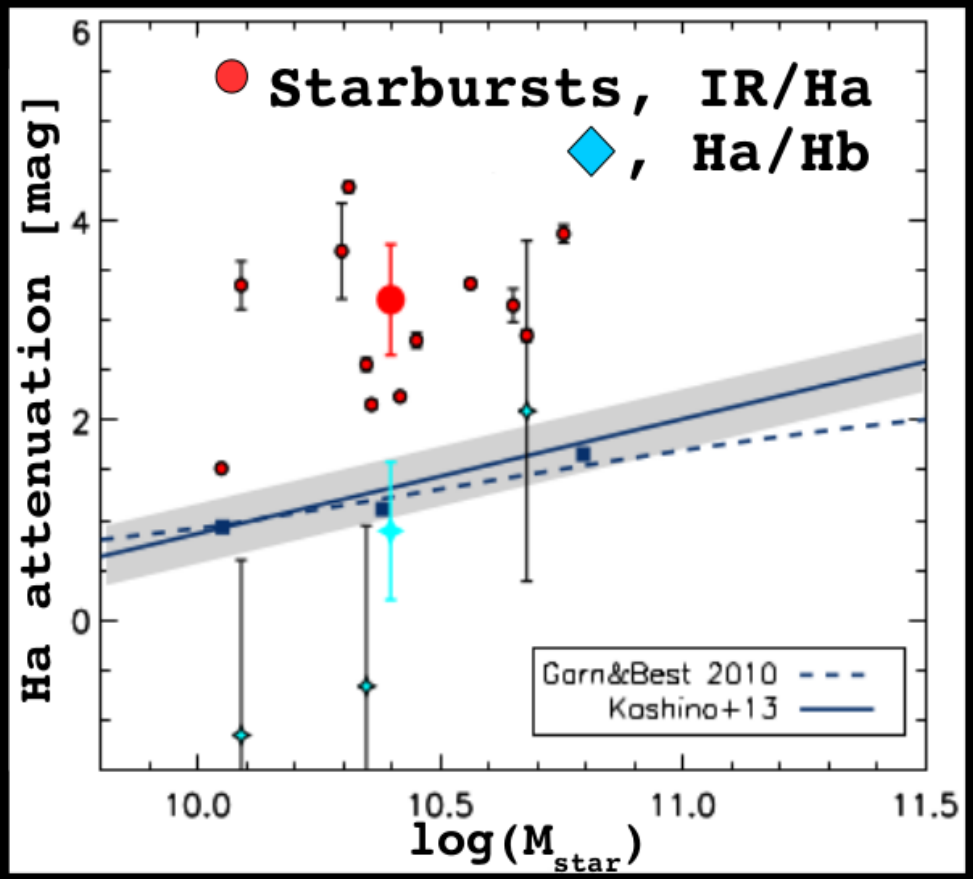
Herschel (far-IR)

A_{Ha} > 4.5 mag

L_{tot}(Ha) ~ 70% thin + 30% thick

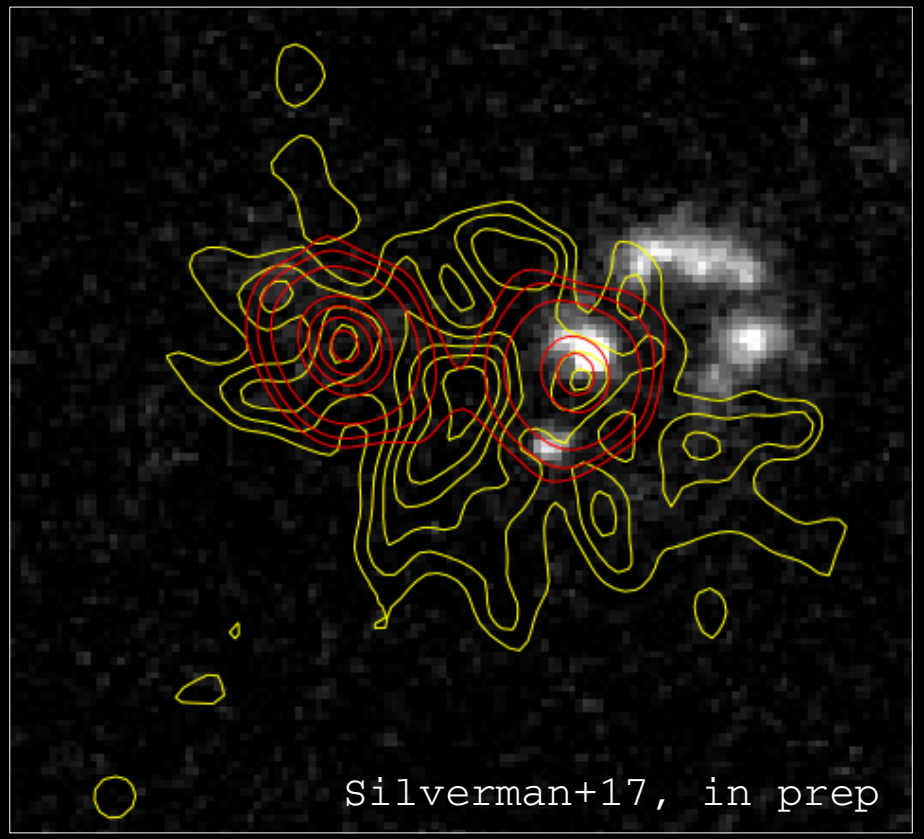
SFR_{TOT} ~ 10% thin + 90% thick

“Decoupling” of optical/far-IR emitting regions



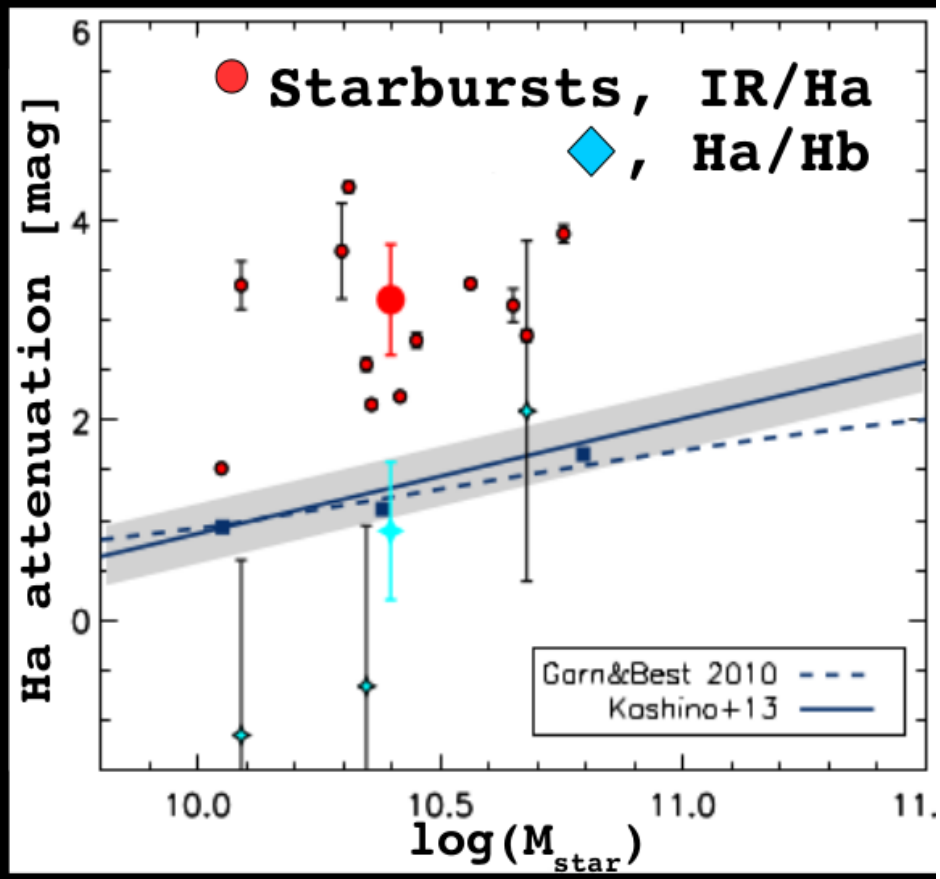
HST F814W image

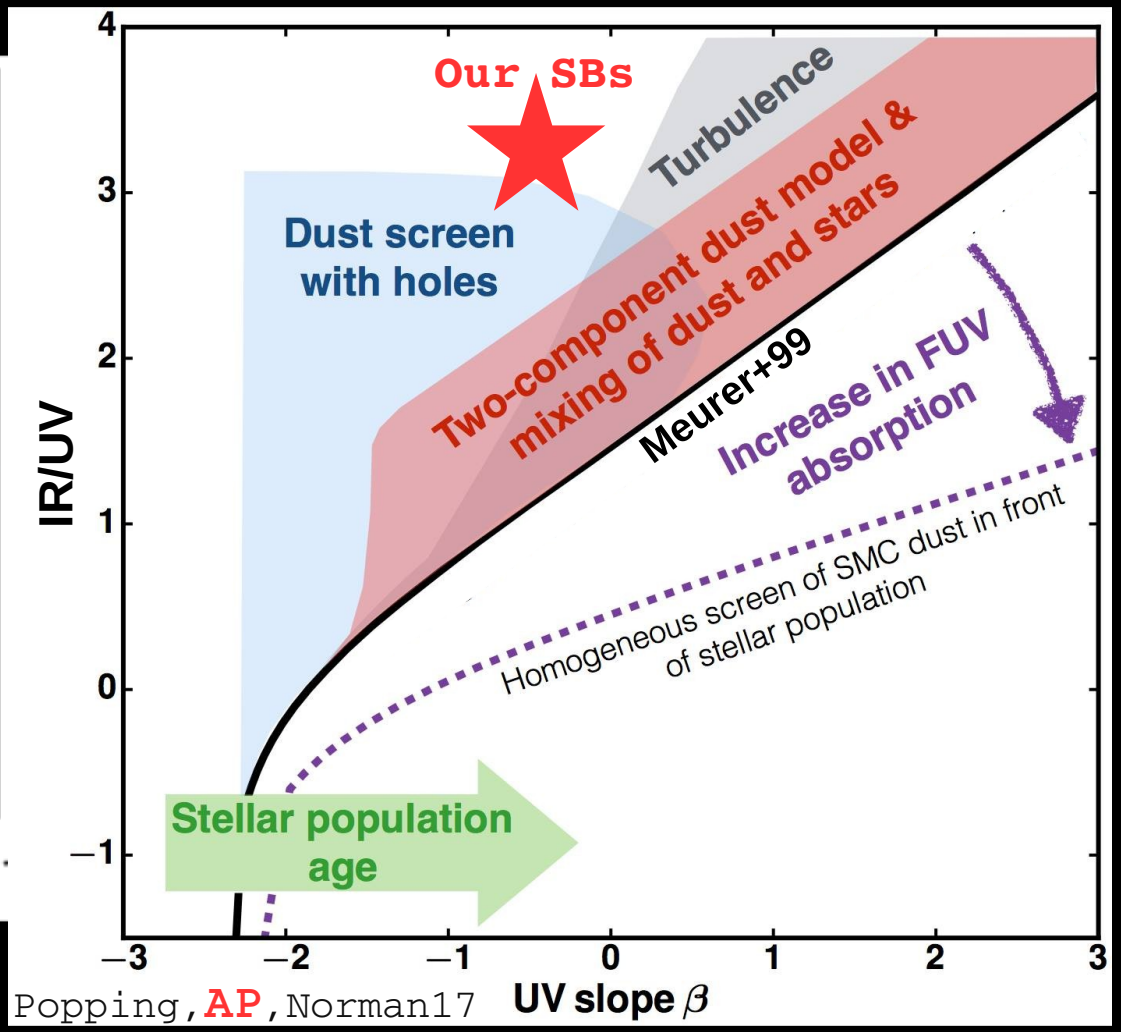
ALMA dust continuum



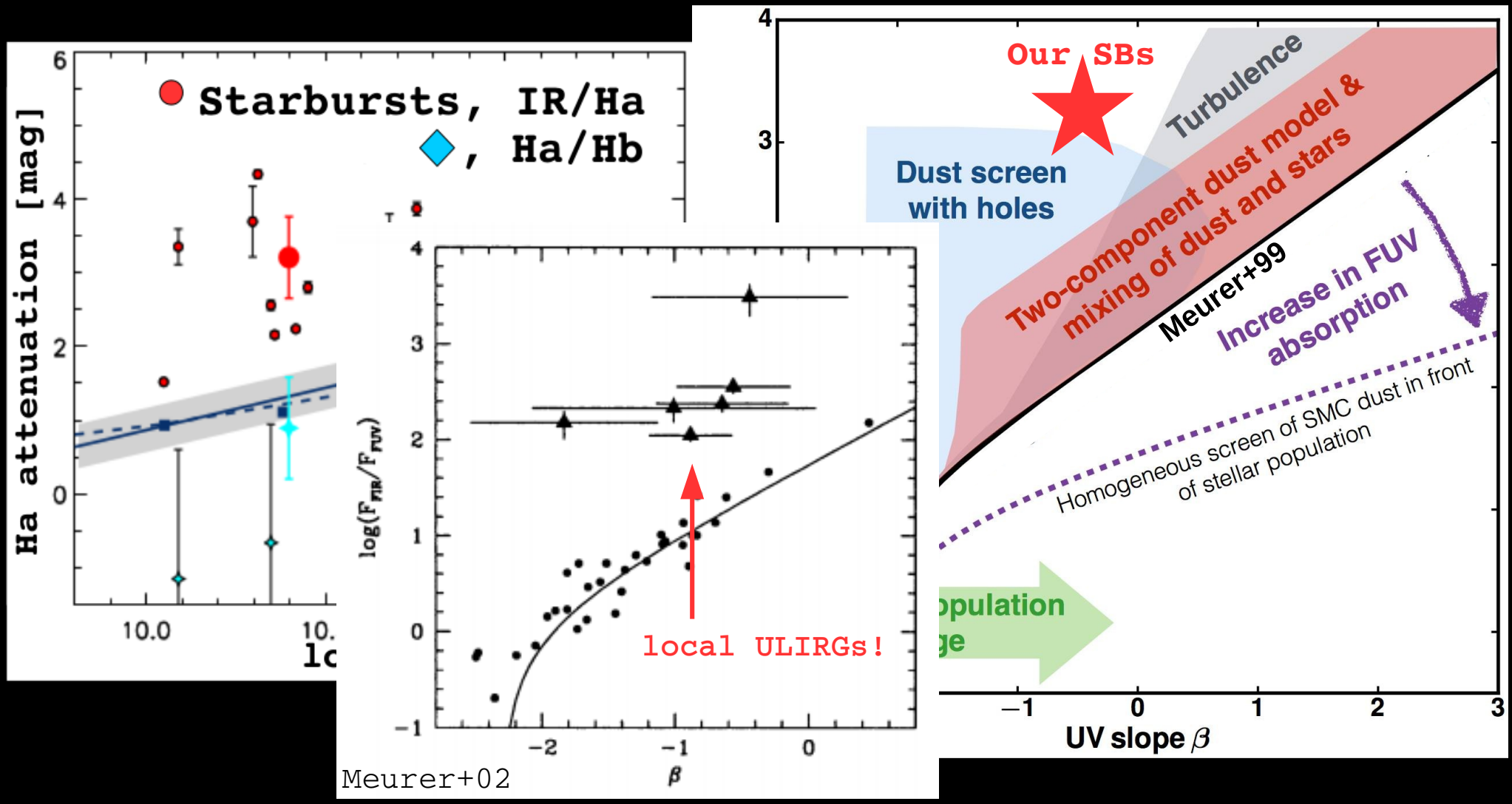
Courtesy of J.D. Silverman

"Decoupling" of optical/far-IR emitting regions



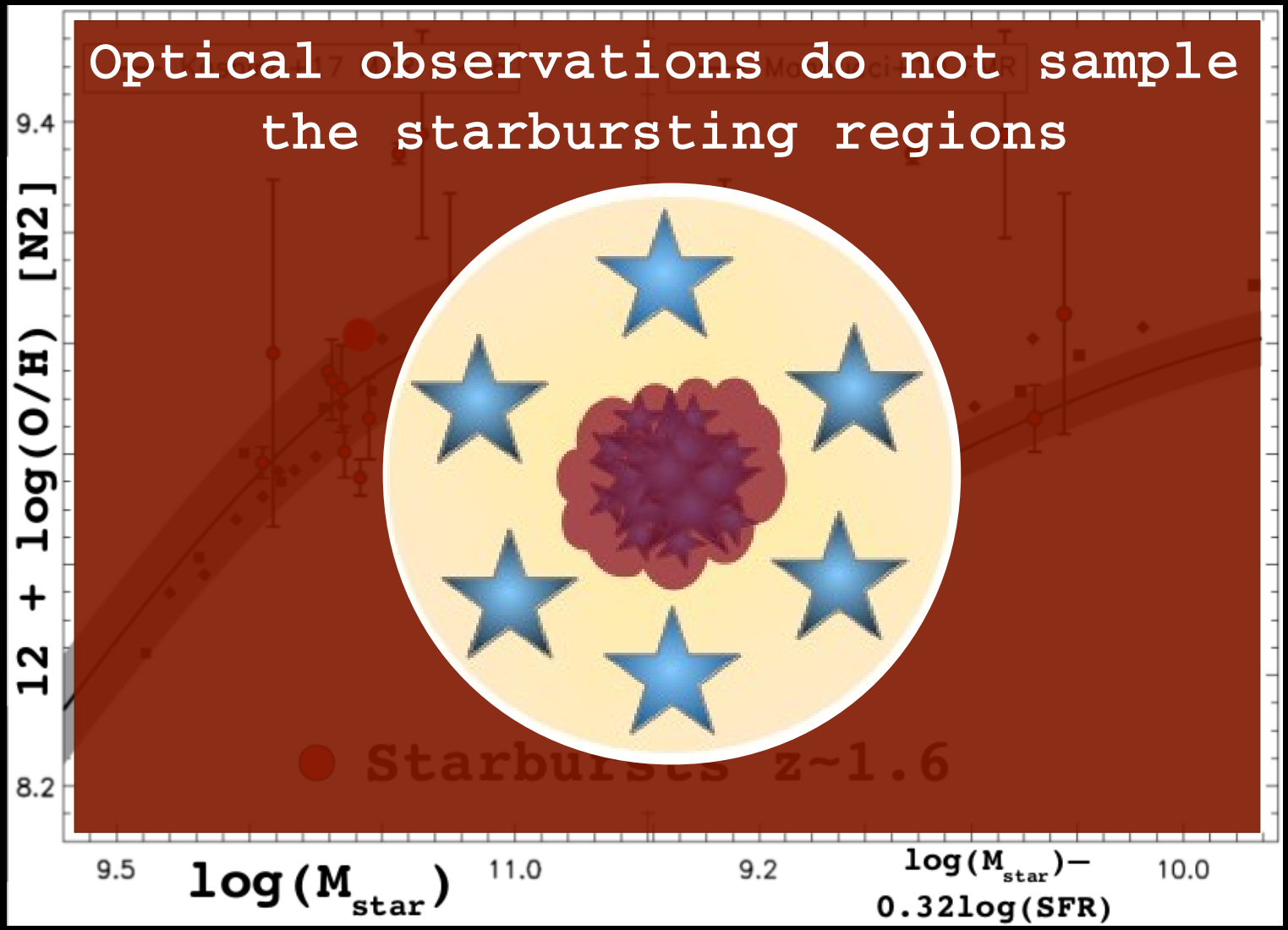


“Decoupling” of optical/far-IR emitting regions



Optical/far-IR "decoupling": implications…

A. Puglisi, Daddi, Renzini et al. 2017, ApJL, 838, L18



Optical/far-IR “decoupling”: … and next steps

Constrain dust attenuation patterns

- JWST/ALMA sinergy
  - ALMA high-res in progress (Silverman+17, in prep)

Access to the heavily obscured core

- Near-IR rest-frame
  - Calabrò+ in prep for starbursts @ z~0.7

Improve the statistics

- New MOS facilities (e.g. VLT/MOONS)

Summary

- MOS surveys are the ultimate tool for studying the average SFG population at high-z and rare sources
- Off-MS starburst galaxies at z~1.6 are metal-rich FMR outliers and host an optically thick starburst core, as local ULIRGs
- The peculiar dust geometry in z~1.6 starbursts requires dedicated modeling.