



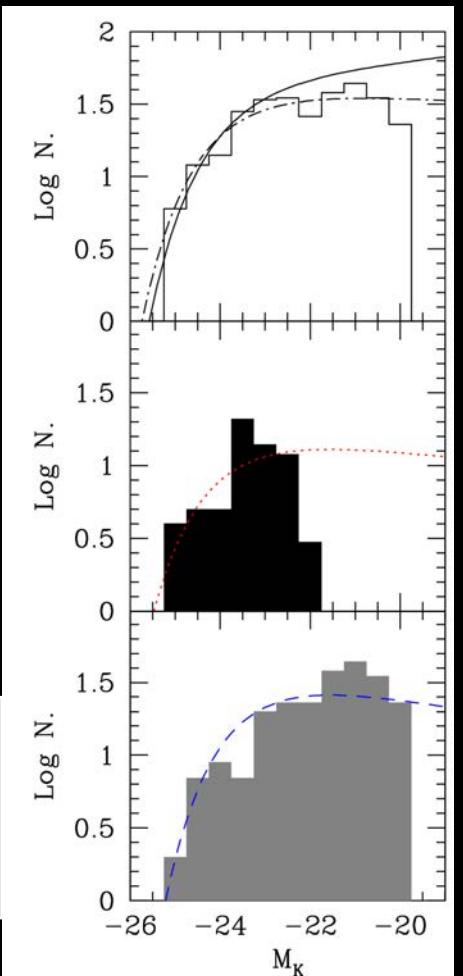
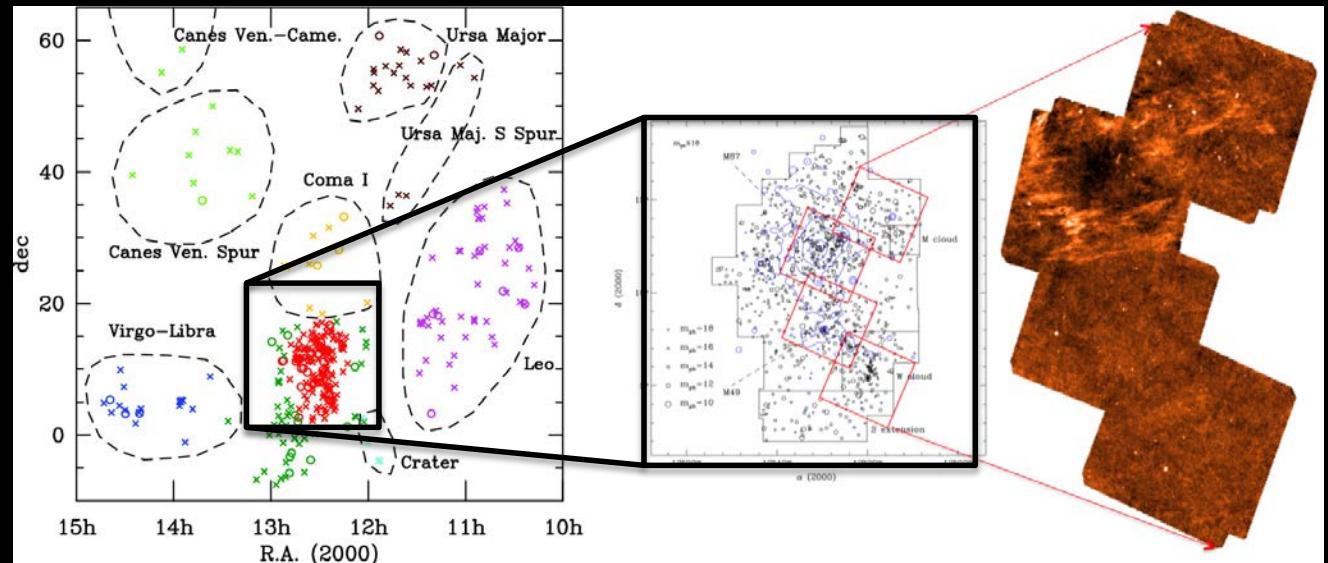
Dust Properties of Nearby Galaxies: Results of the Herschel Reference Survey

Laure CIESLA,
M. BOQUIEN, A. BOSELLI, V. BUAT, L. CORTESE,
and the SAG2

The *Herschel* Reference Survey (HRS)

PI: S. Eales, Boselli+10a

The *Herschel* Virgo Cluster Survey (HeViCS) PI: J. Davies, Davies+10



Subsample and Ancillary data:

146 Late-type Normal Galaxies

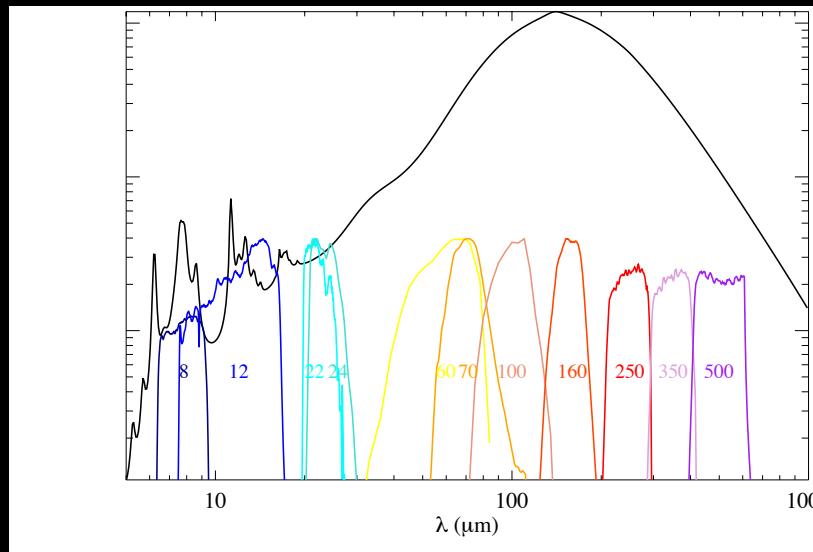
Sa and later types

$\text{defHI} < 0.4$

8:	38%
12:	100%
22, 24:	97%
60:	88%
70:	32%
100:	100%
160:	100%
250:	100%
350:	100%
500:	100%

Boselli
+09,12
Hughes+12

Properties	Number of galaxies
M_*	146
SFR	141
b	141
$\Sigma(H\alpha)$	129
$\mu_e(H)$	146
$12 + \log(O/H)$	124
$A(FUV)$	117
L_{IR}	146
M_{dust}	146



IRAC(8) WISE
(12&22)
Ciesla+
to be
submitted

PACS
Cortese+
to be
submitted

SPIRE
Ciesla+12

IRAS
Literature

MIPS
Bendo+12

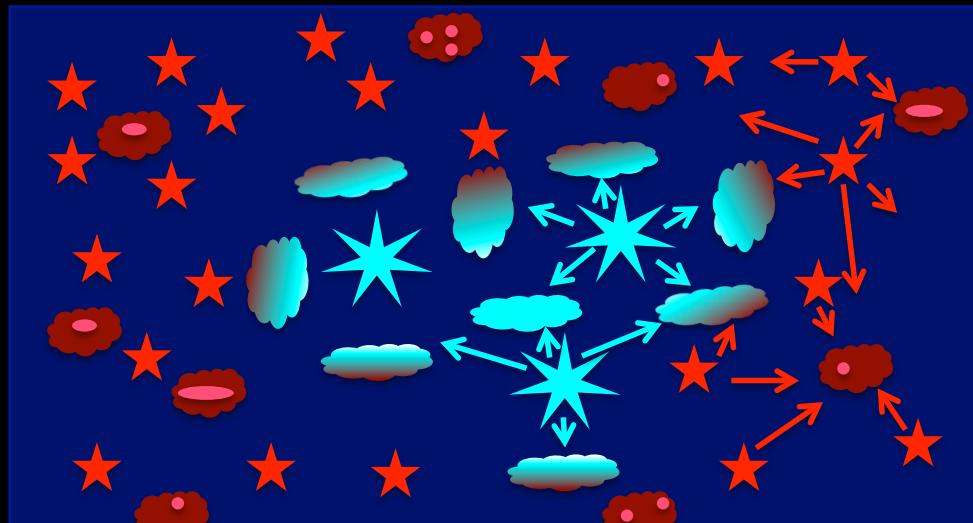
Dust models of Draine & Li (2007)

Dust as a mixture of **amorphous silicate** grains and **carbonaceous** grains.

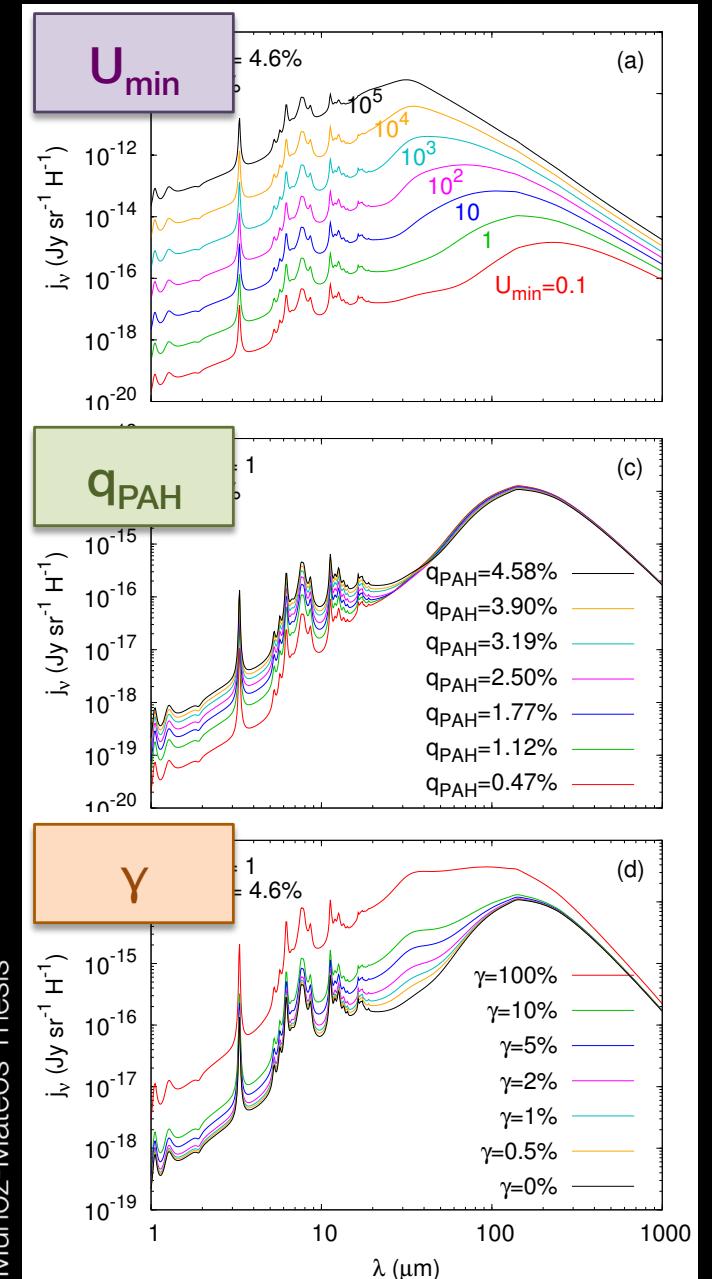
Models parametres:

dust type (MW), $U_{\max}=10^6$,

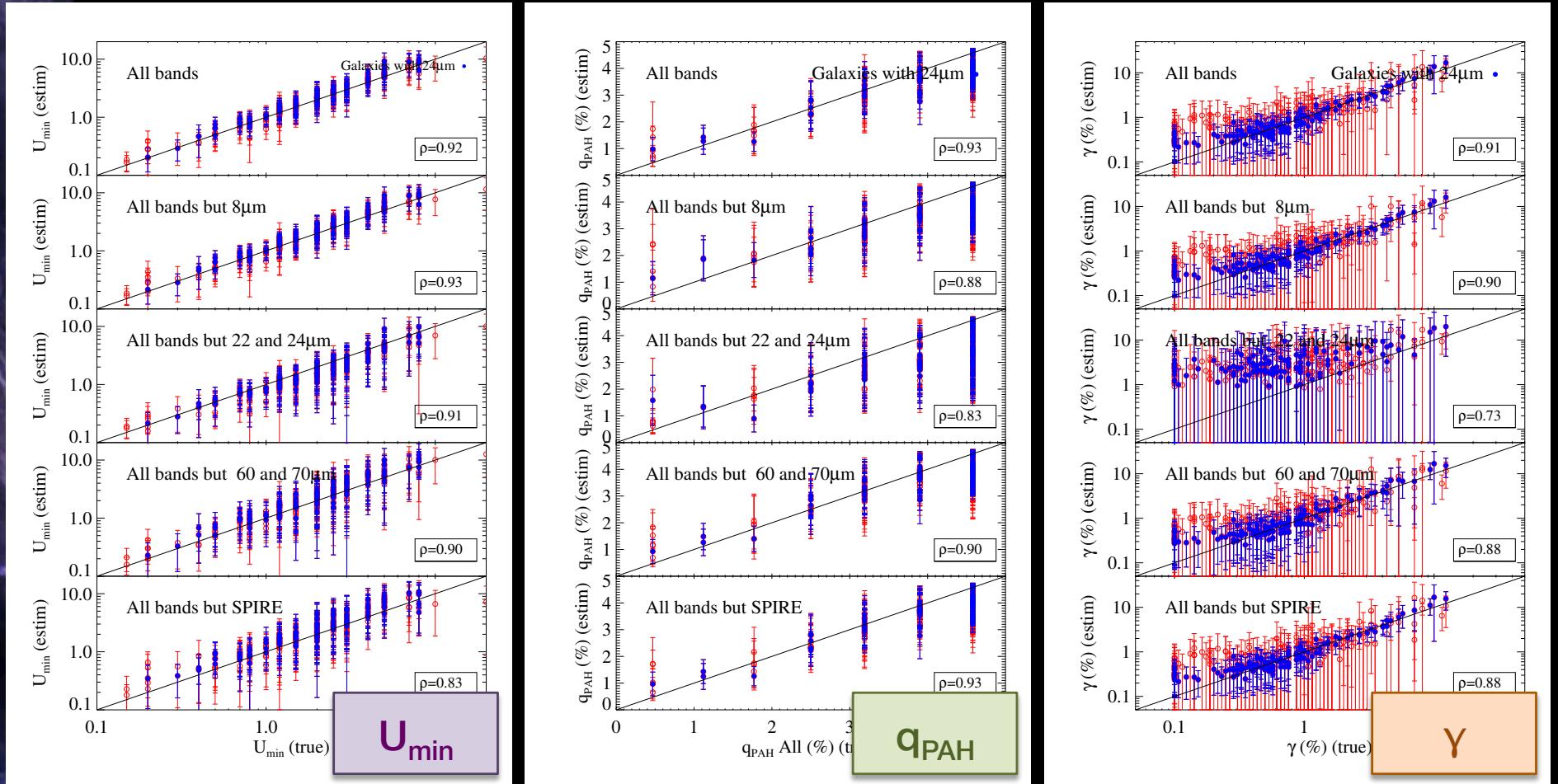
U_{\min} , Υ , q_{PAH}



$$j_\nu = (1 - \Upsilon) j_\nu [U_{\min}, U_{\min}] + \Upsilon j_\nu [U_{\min}, U_{\max}]$$



Constraints on the parameters: Mock catalogues

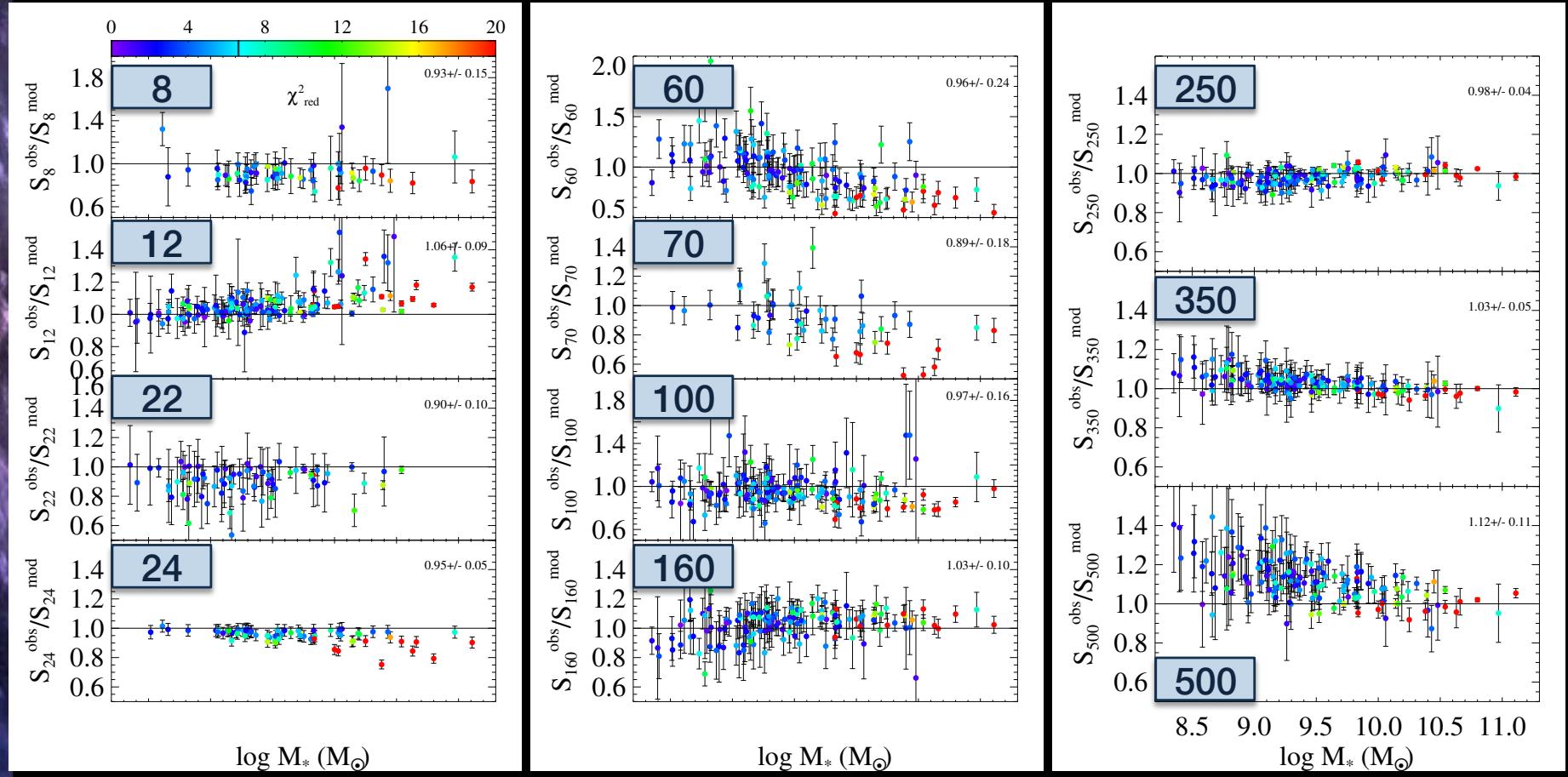


Good correlation → Good constraint

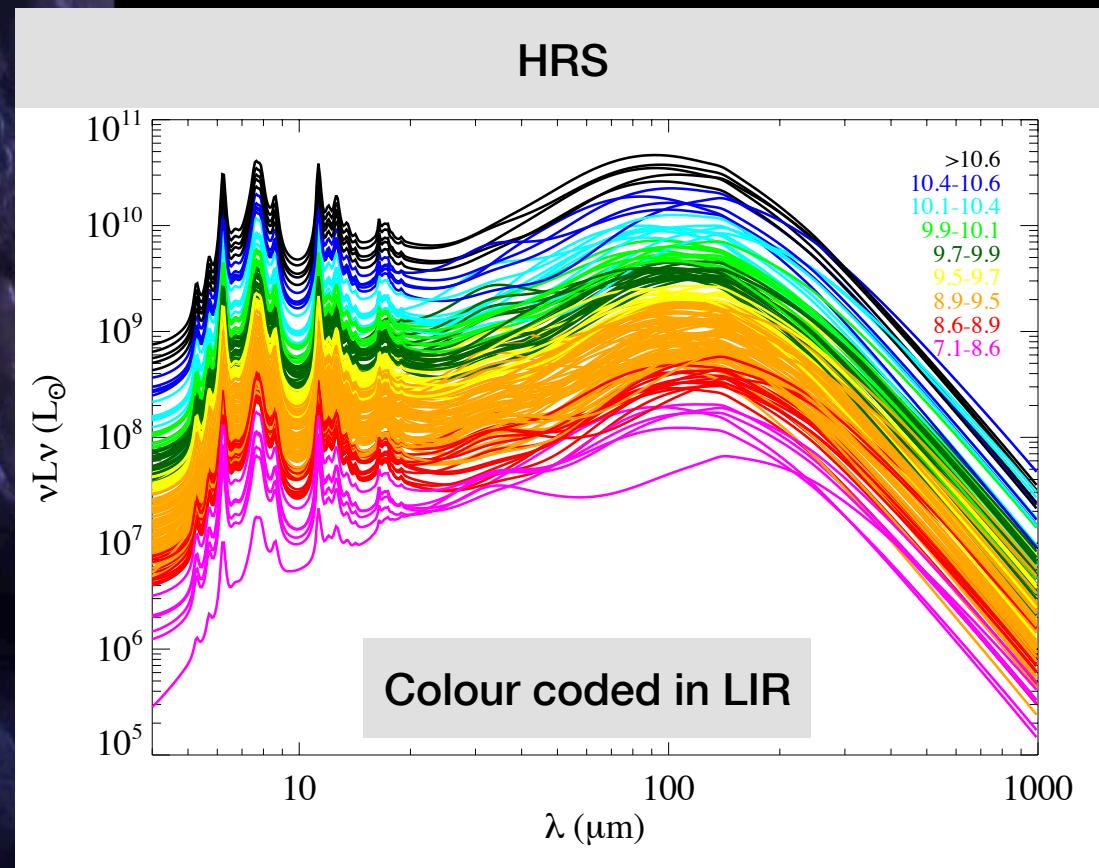
LIR and M_{dust} very well constrained.

Results of the fits:

$S_{\text{obs}}/S_{\text{model}}$ versus M_*

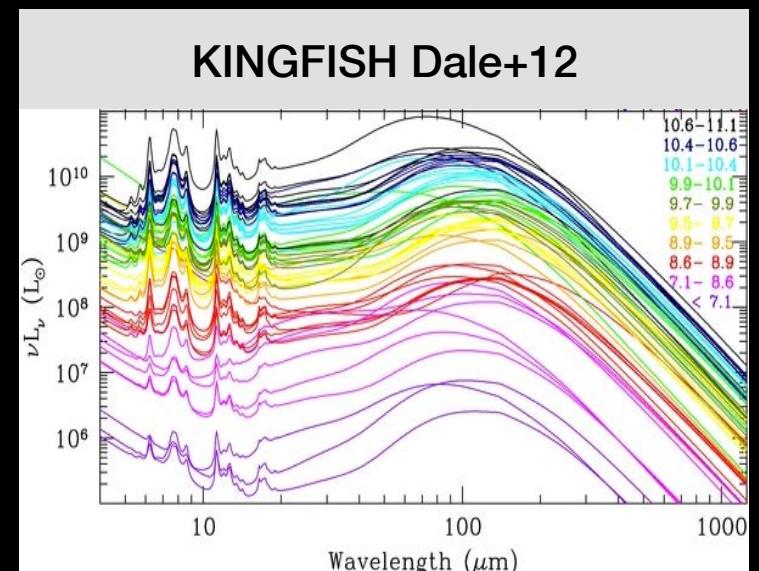


Results of the fits:

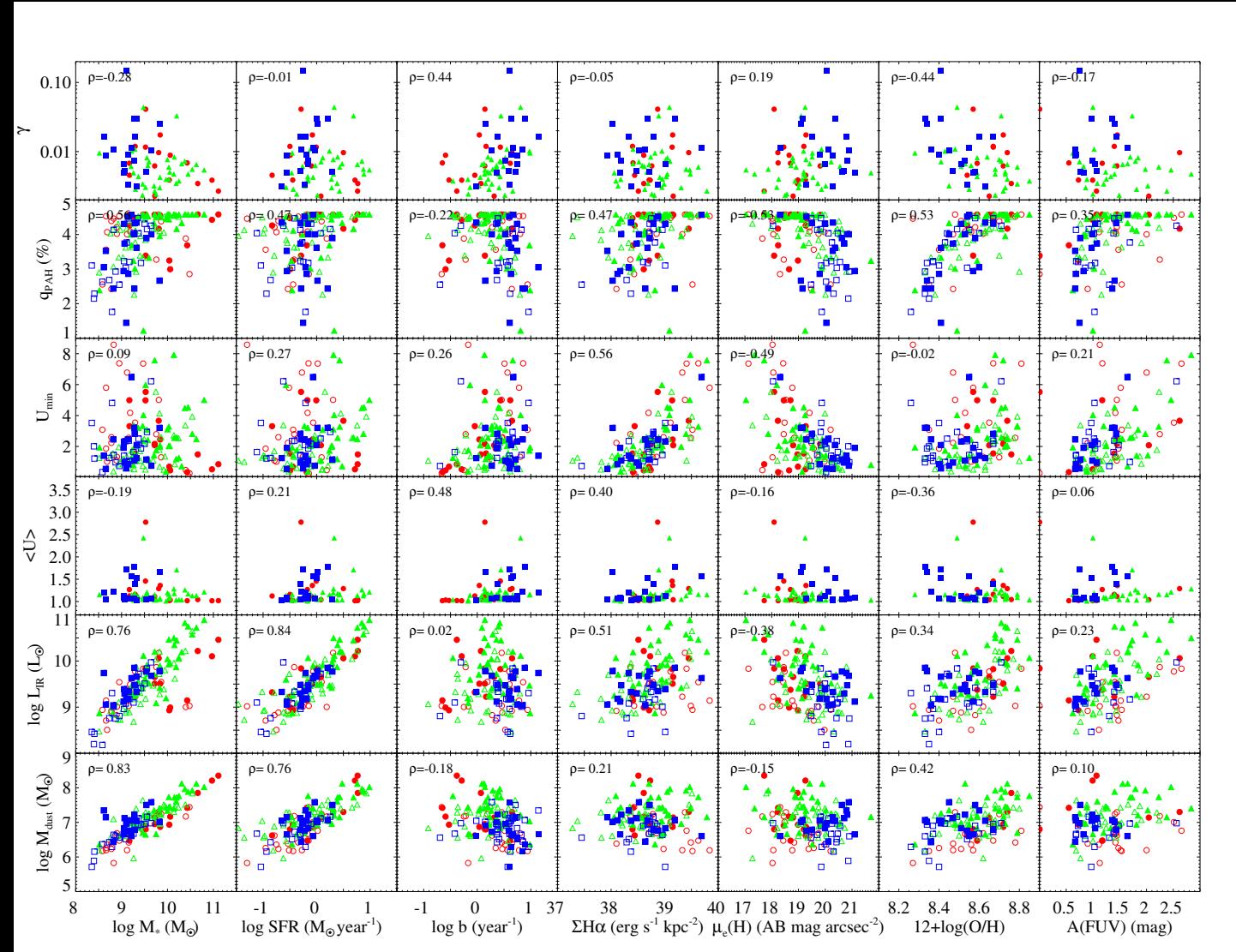


Mean Properties

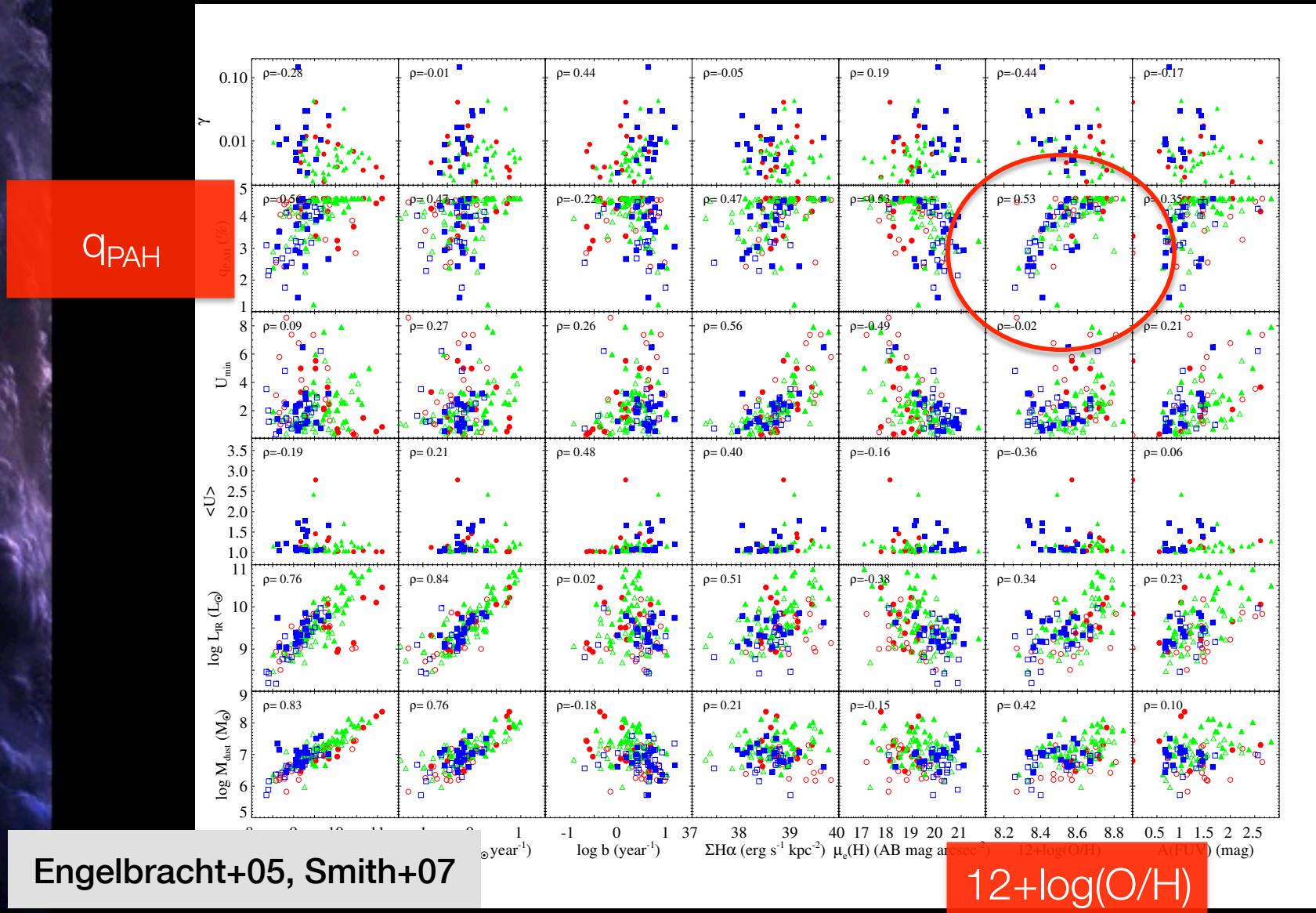
Umin: 2.34 ± 0.58
qPAH: $3.90 \pm 0.48 \%$
 γ : $1.10 \pm 0.48 \%$
 $\langle U \rangle$: 1.23
log LIR: 9.47 ± 0.04
log Mdust: 7.00 ± 0.09



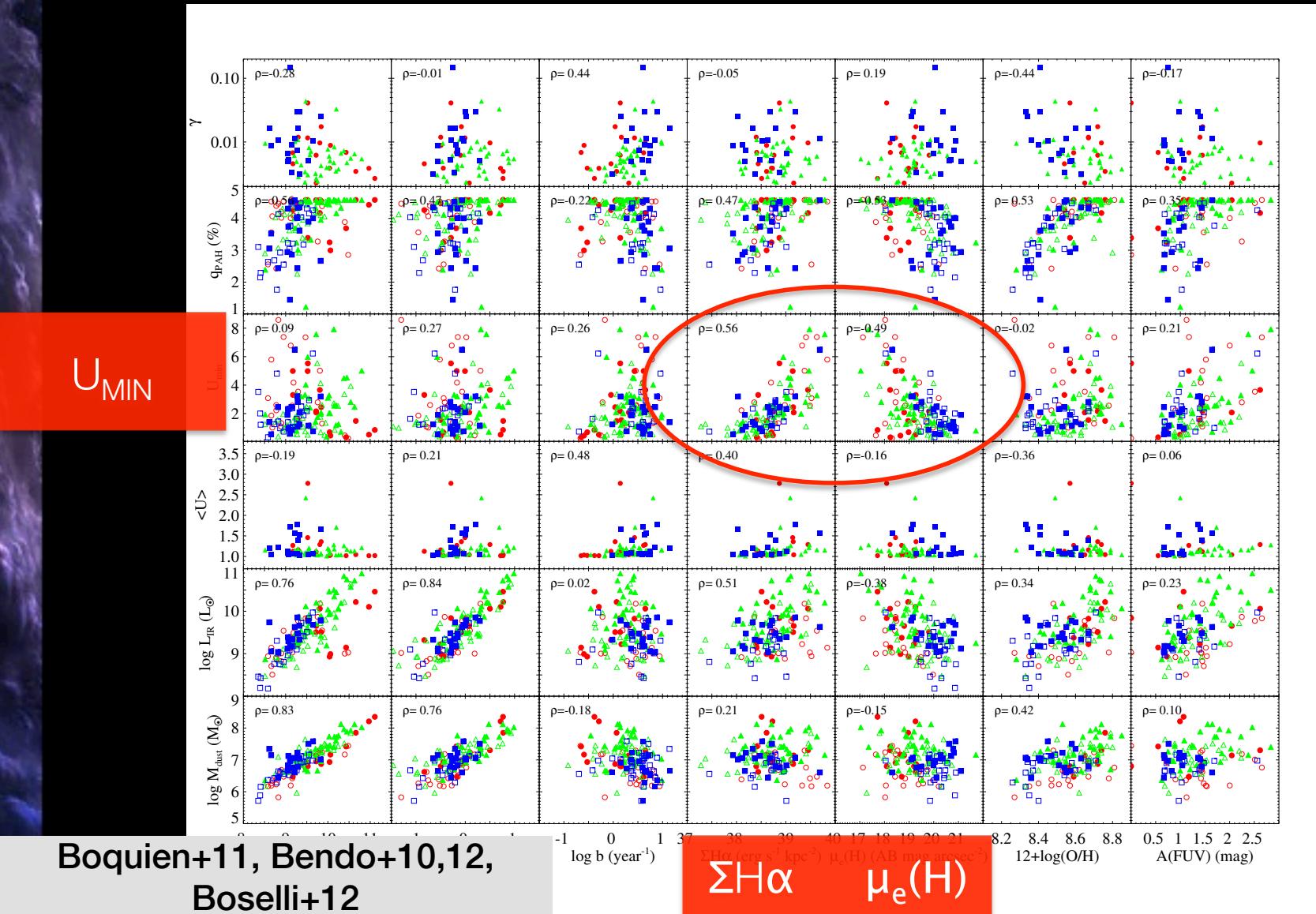
Output parameters vs physical variables



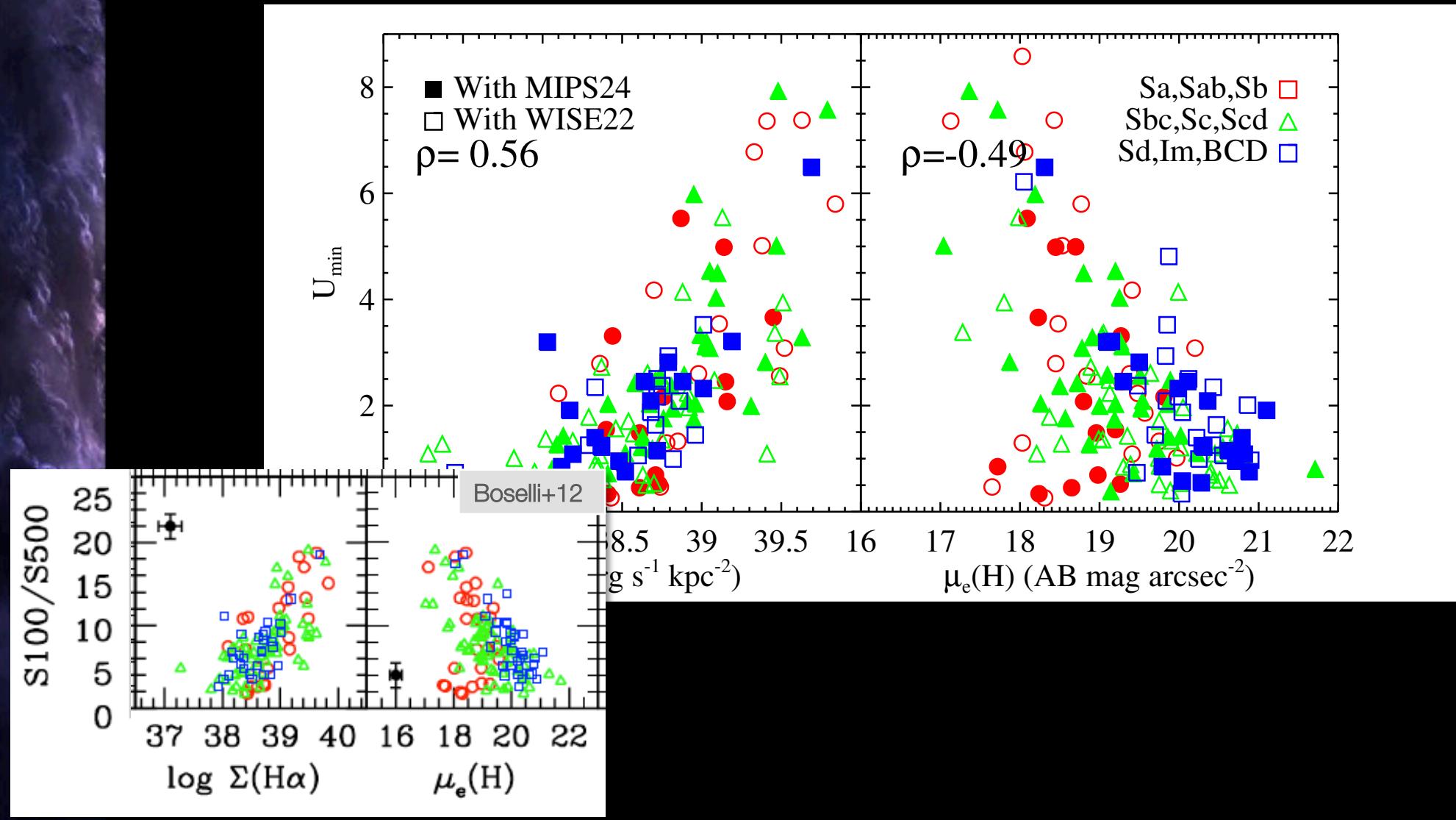
Output parameters vs physical variables



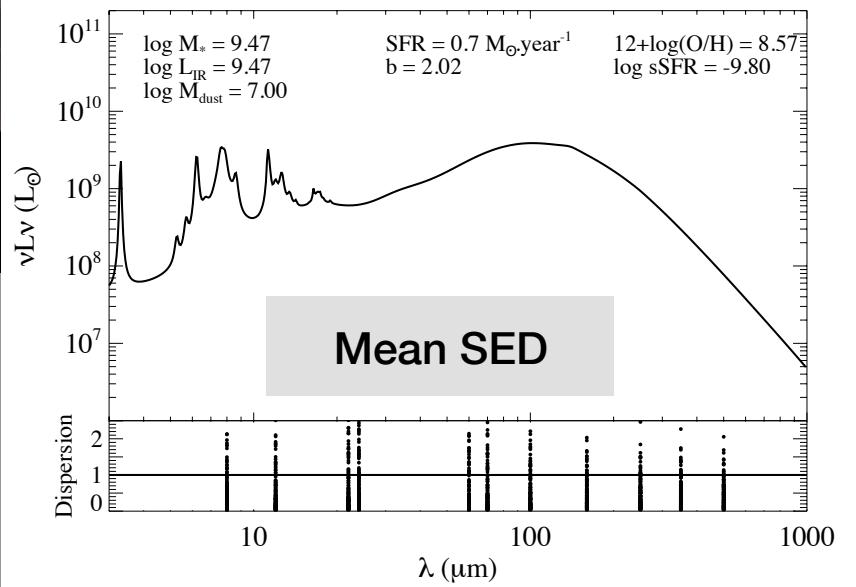
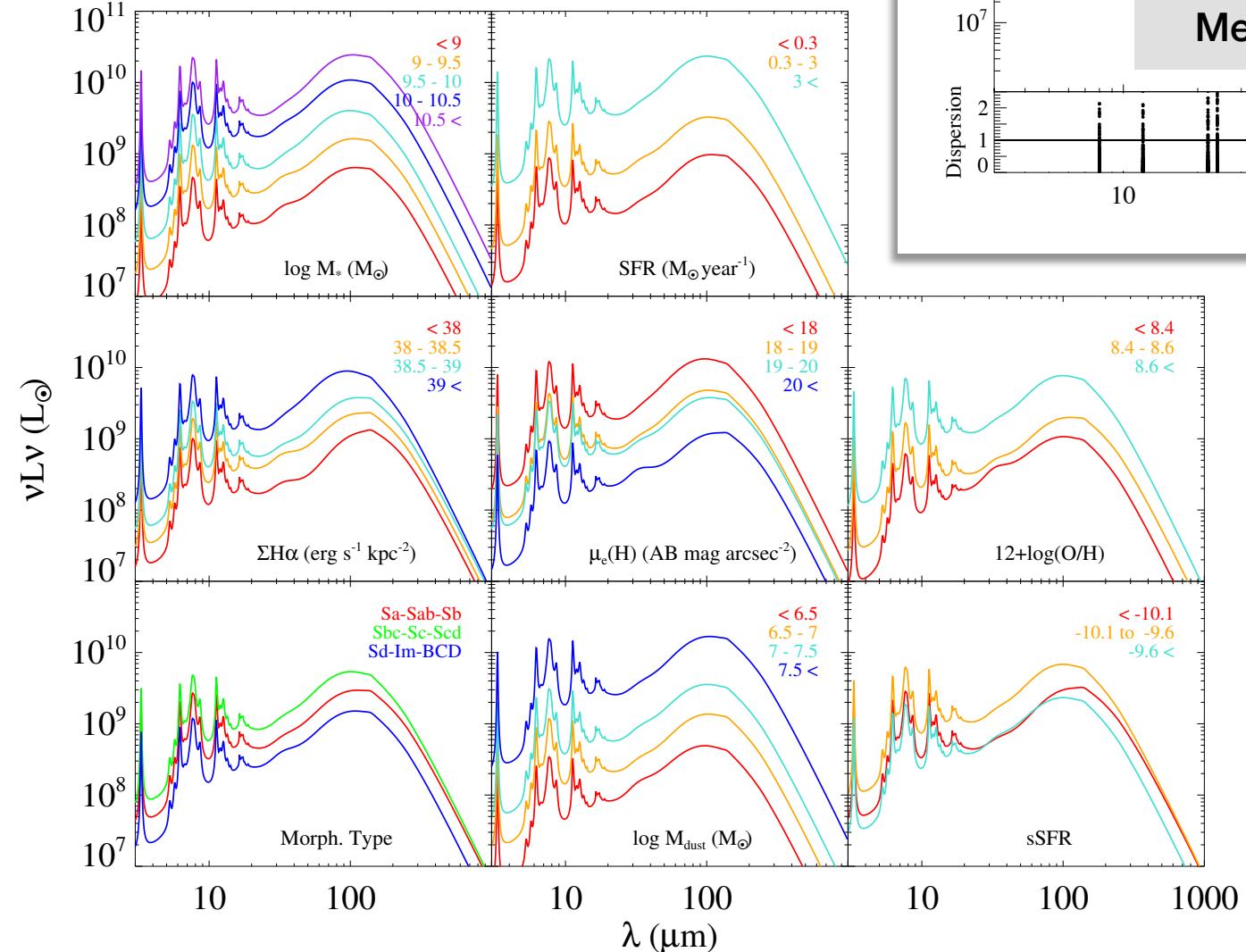
Output parameters vs physical variables



Output parameters vs physical variables



New set of IR templates



Constrained with
Herschel data.

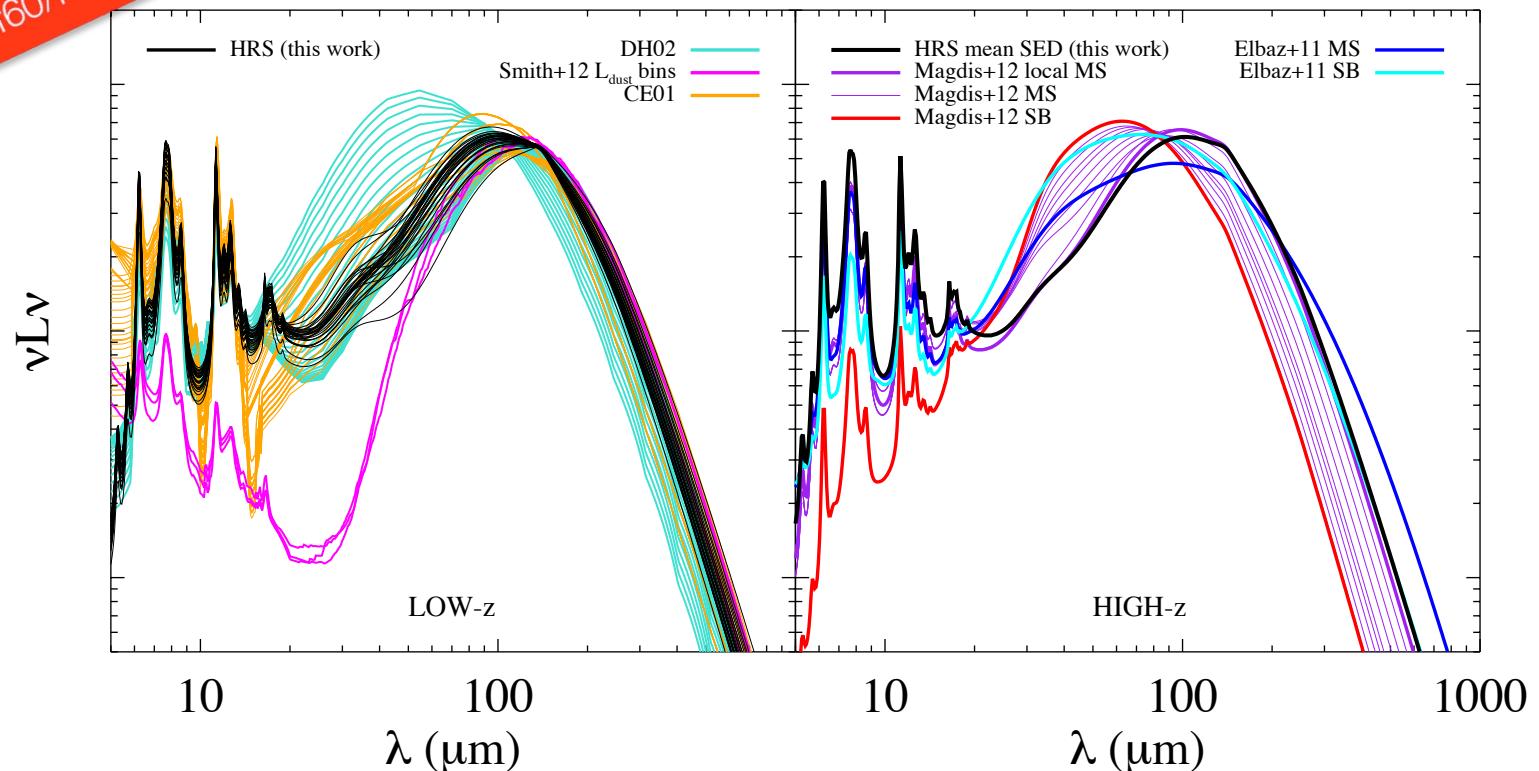
Representative of
normal galaxies in
the nearby
Universe

Comparison with the literature

Chary&Elbaz01, Dale&Helou02, Smith+11, Elbaz+11 and Magdis+12

Large discrepancy in the 20-60 microns range.

For comparable
LIR, f₆₀/f₁₀₀

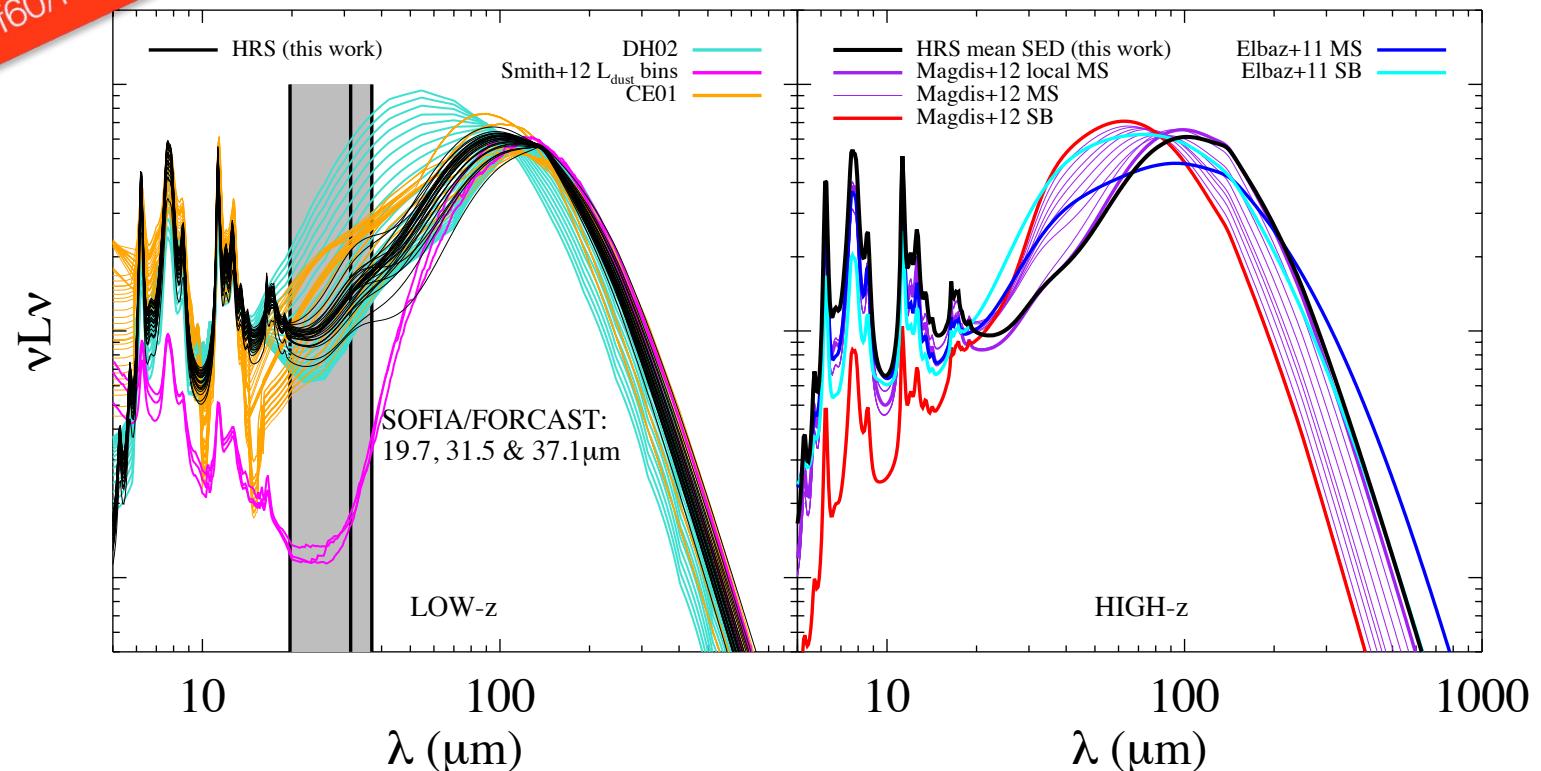


Comparison with the literature

Proposal submitted: SOFIA/FORCAST

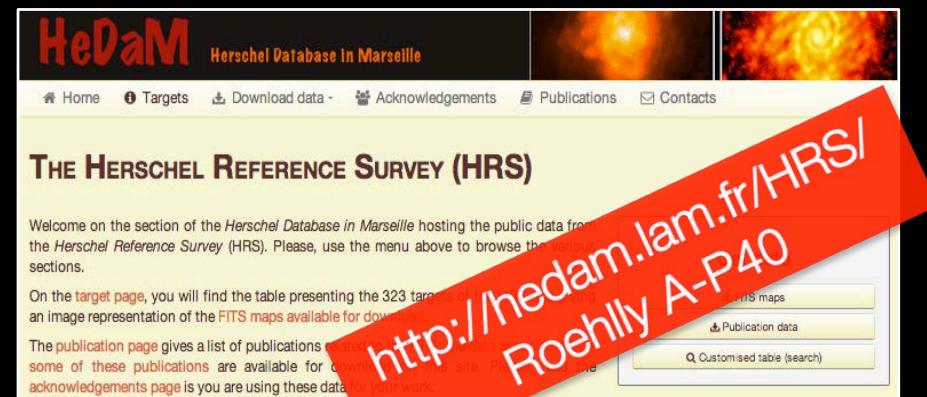
Observations of Arp 220, M99 & M100 @ 19.7, 31.5 and 37.1 microns.
M82 already available (Nikola+12).

For comparable
LIR, f₆₀/f₁₀₀



Conclusions

- ✓ Parameters of Draine&Li (2007) well constrained, but need for strong constraints between 20-60 microns for γ .
- ✓ The Draine&Li (2007) models do not reproduce the observed 500 microns in low mass systems.
- ✓ Confirmation on a large sample of the well-known correlation between the intensity of the PAH emission and the metallicity.
- ✓ Results suggest that the diffuse dust component may be heated by both diffuse evolved stars and star forming regions.
- ✓ IR SED templates calibrated with Herschel data, and representative of the nearby Universe available.
→ ciesla@physics.uoc.gr
- ✓ Large discrepancy of IR templates in the 20-60 microns range.





Thank you !

More of HRS:

Talk of M. SMITH (Session 12a)
Posters of M. BOQUIEN (A-P05), G. BENDO (B-P03)