

Andromeda in all colours

Dust scaling relations
at sub-kpc resolution

Sébastien Viaene
and the HELGA team:

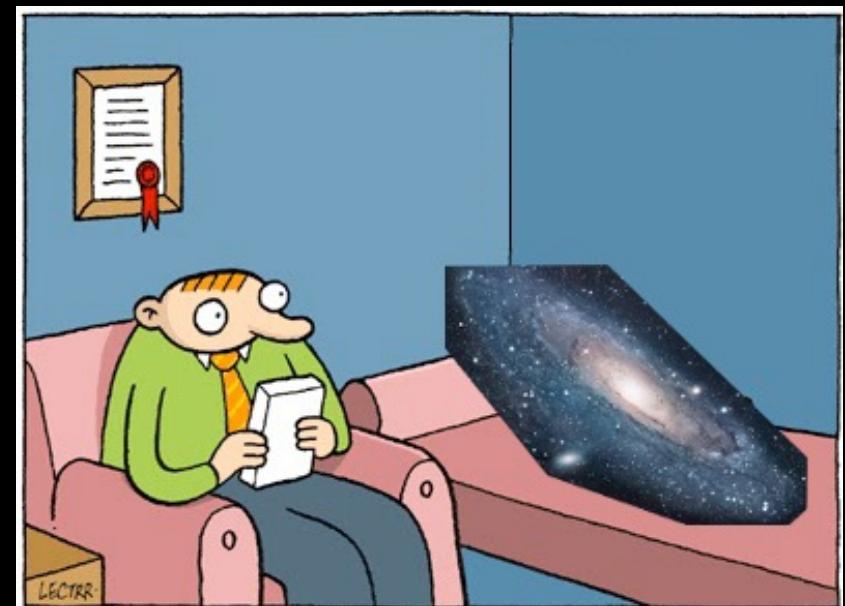
J. Fritz, M. Baes, G.J. Bendo, J.A.D.L. Blommaert, M.
Boquien, A. Boselli, L. Ciesla, L. Cortese, I. De Looze, W.K.
Gear, G. Gentile, T.M. Hughes, T. Jarrett, O.L. Karczewski,
M.W.L. Smith, L. Spinoglio, A. Tamm, E. Tempel, D. Thilker, J.
Verstappen



UNIVERSITEIT
GENT

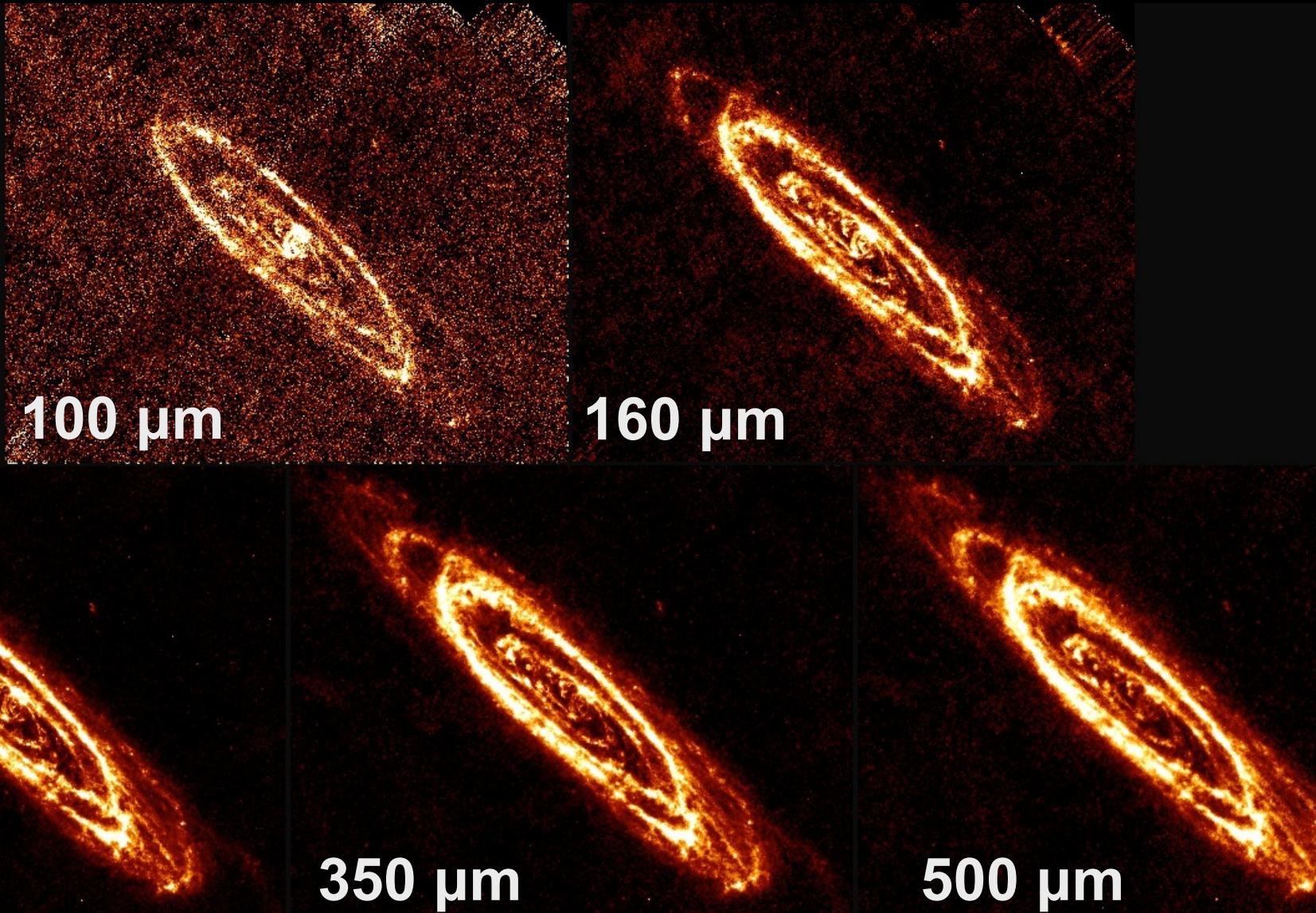
Why we like M31:

- > Large galaxy ($>10^{10}M_{\odot}$)
- > Nearby (< 1 Mpc)
- > Properties of ETG
- > Properties of LTG
- > Signs of a troubled past



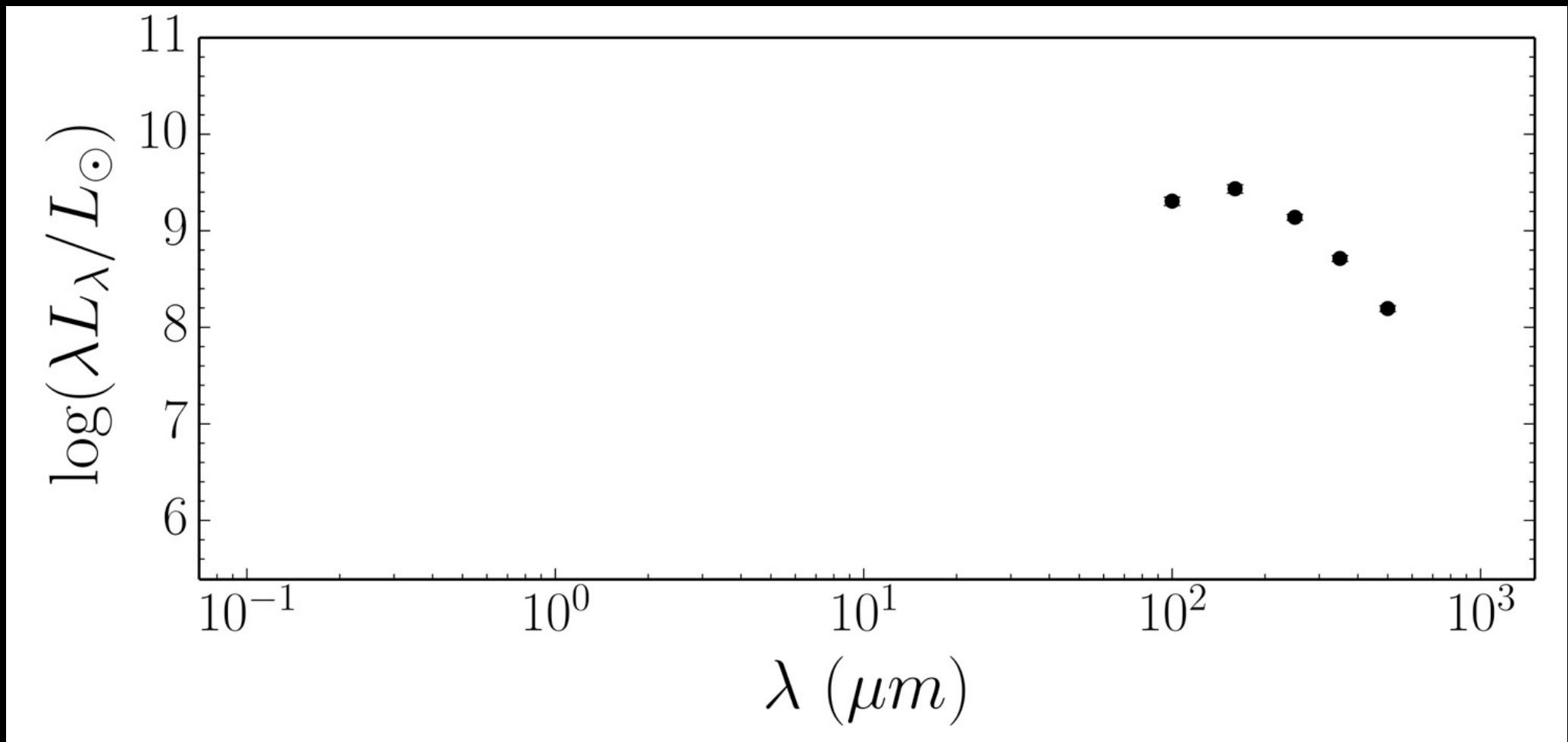
HELGA: Dataset

Modelling the panchromatic SED of M31



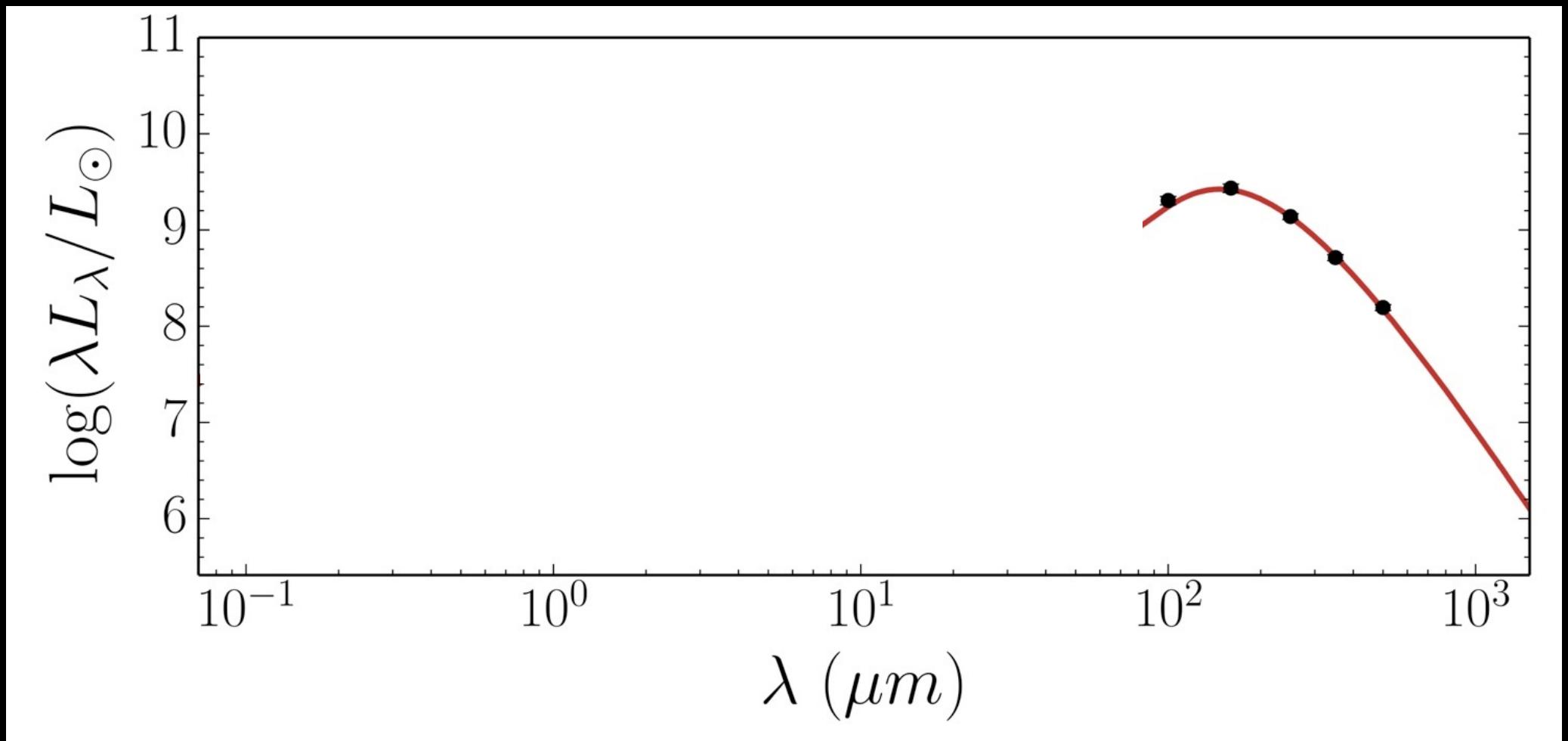
HELGA: Herschel maps

>Cold dust emission

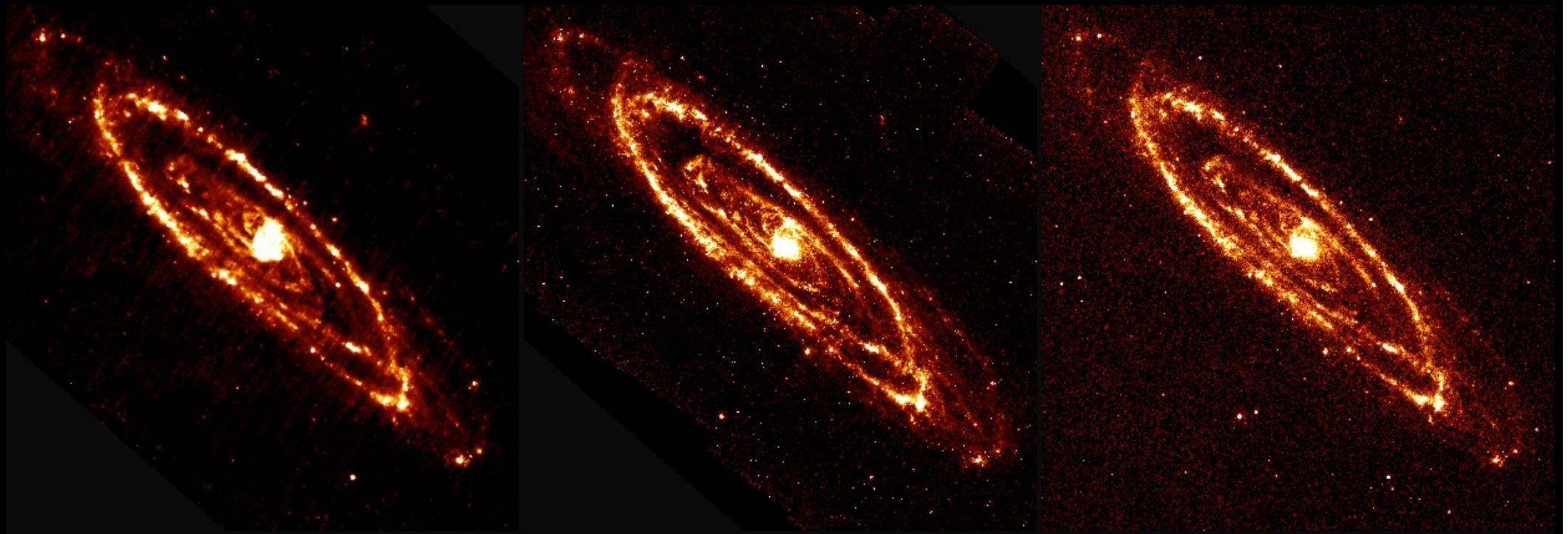


HELGA: Herschel maps

>Cold dust emission



HELGA: FIR maps



MIPS 70 μm

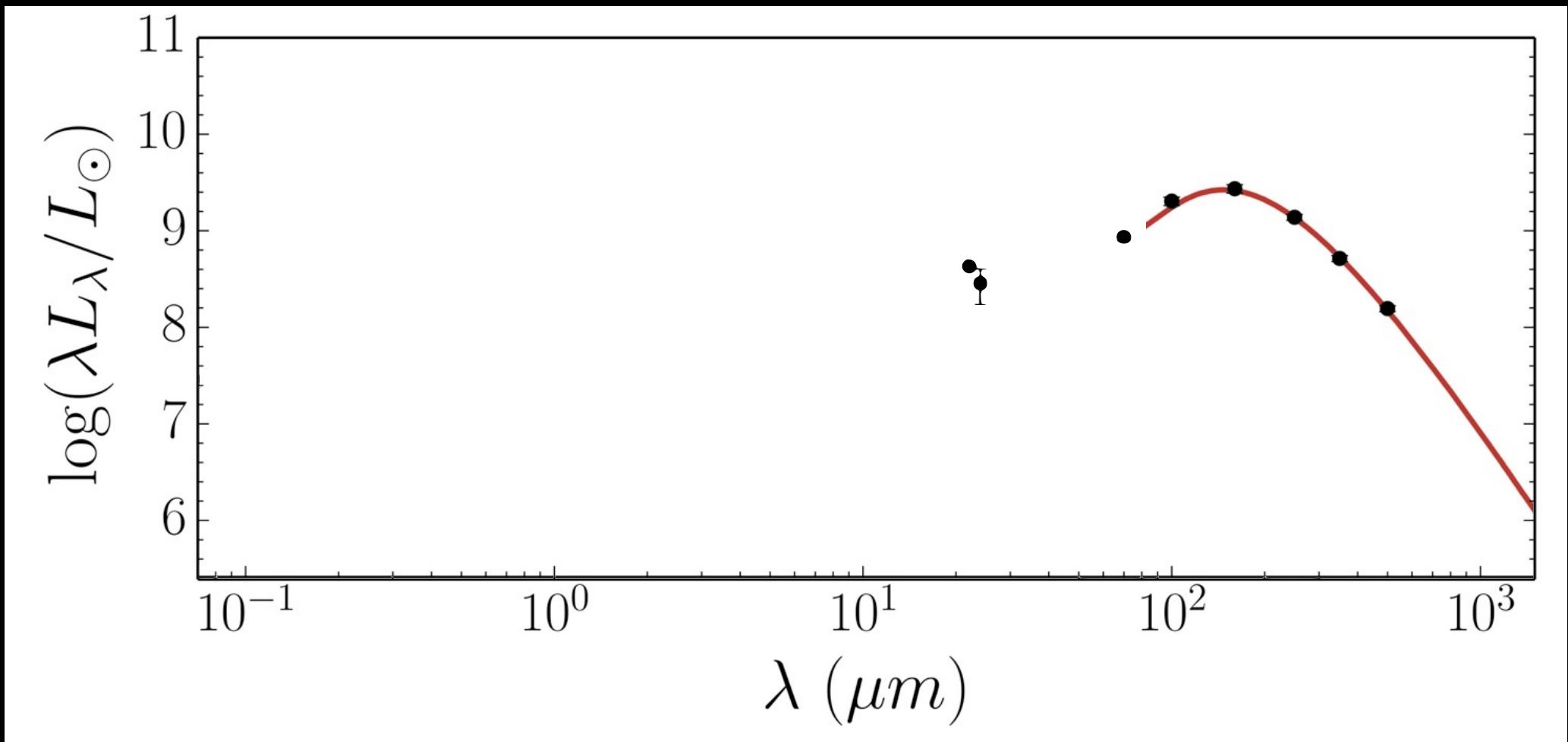
MIPS 24 μm

WISE 22 μm

K. Gordon, T. Jarrett

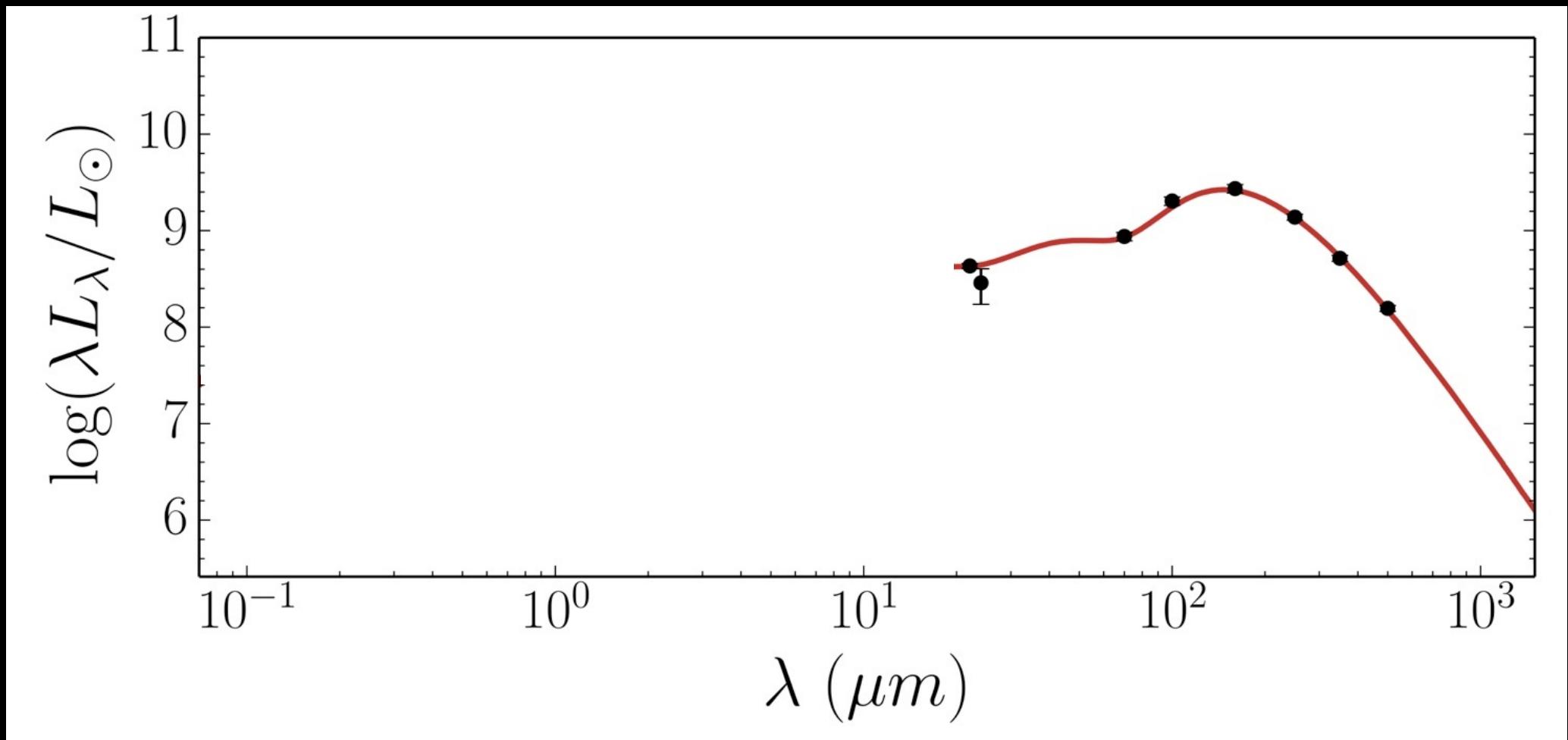
HELGA: FIR maps

> Warm dust emission

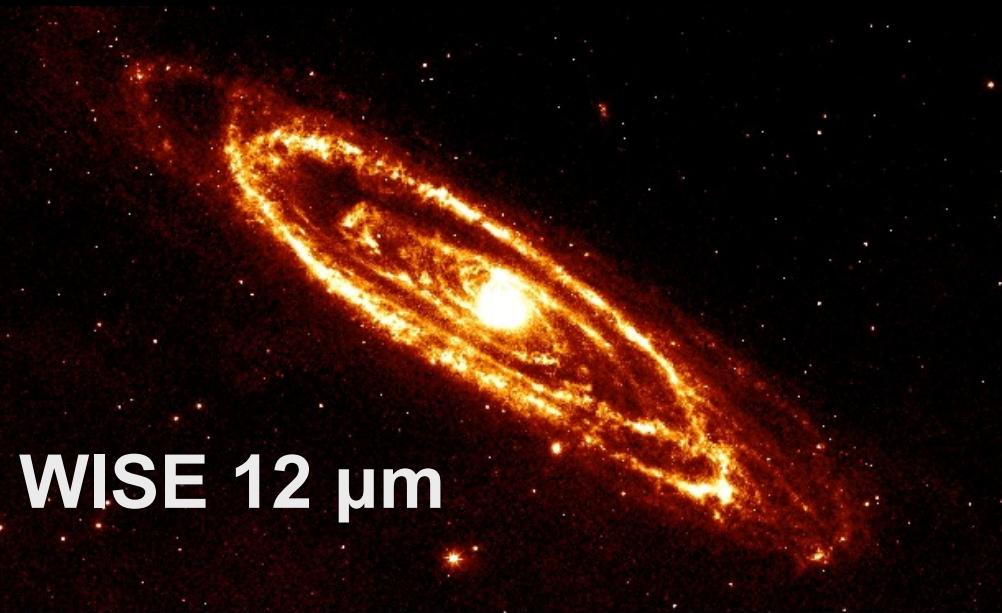


HELGA: FIR maps

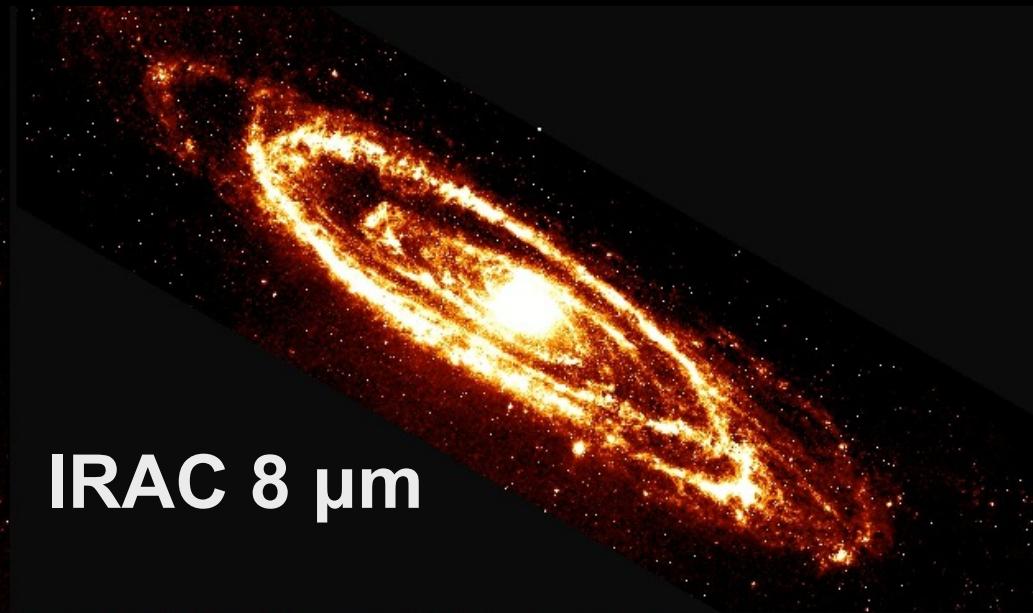
> Warm dust emission



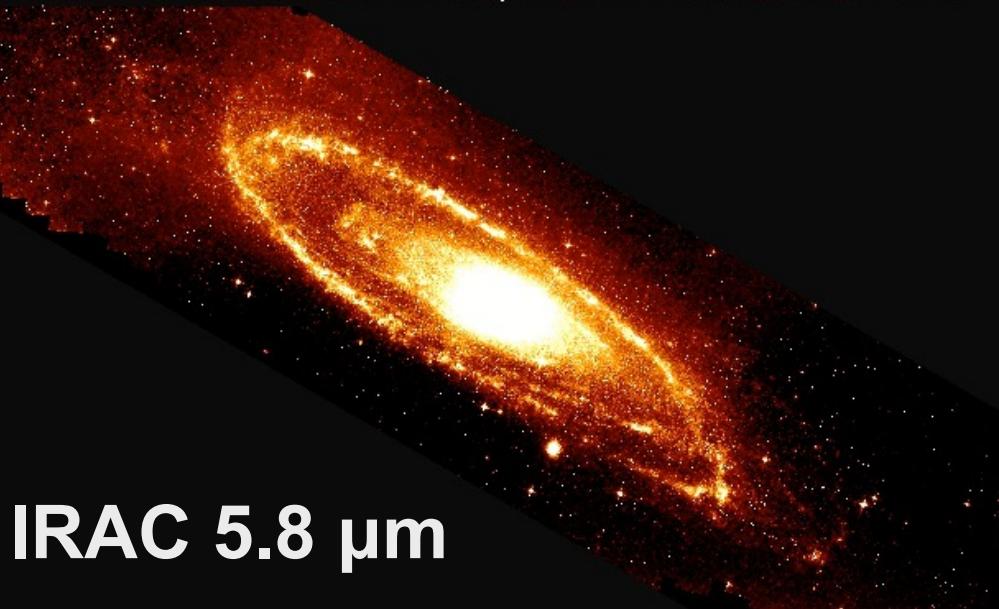
HELGA: MIR maps



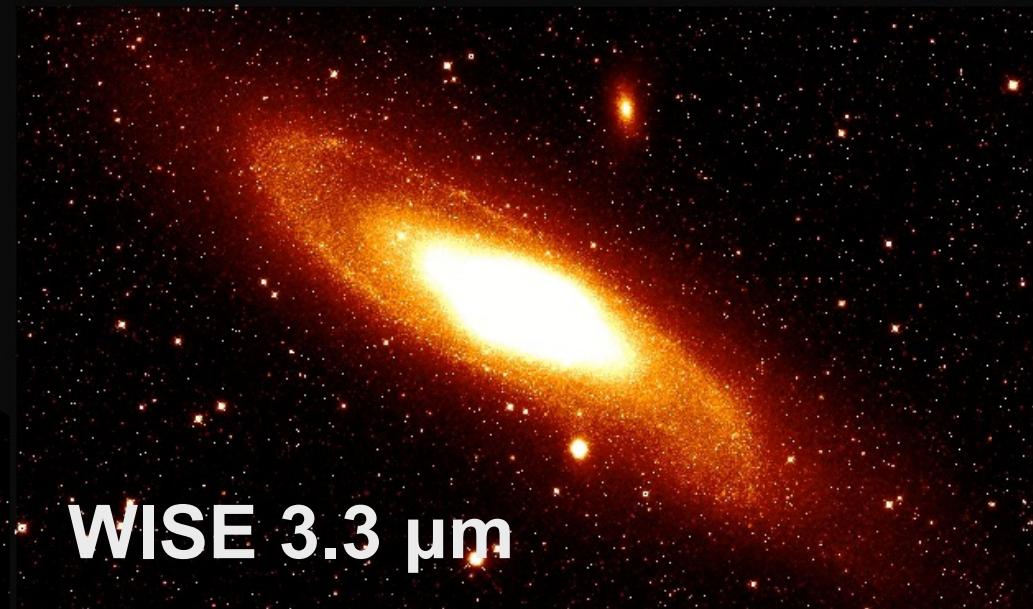
WISE 12 μm



IRAC 8 μm



IRAC 5.8 μm

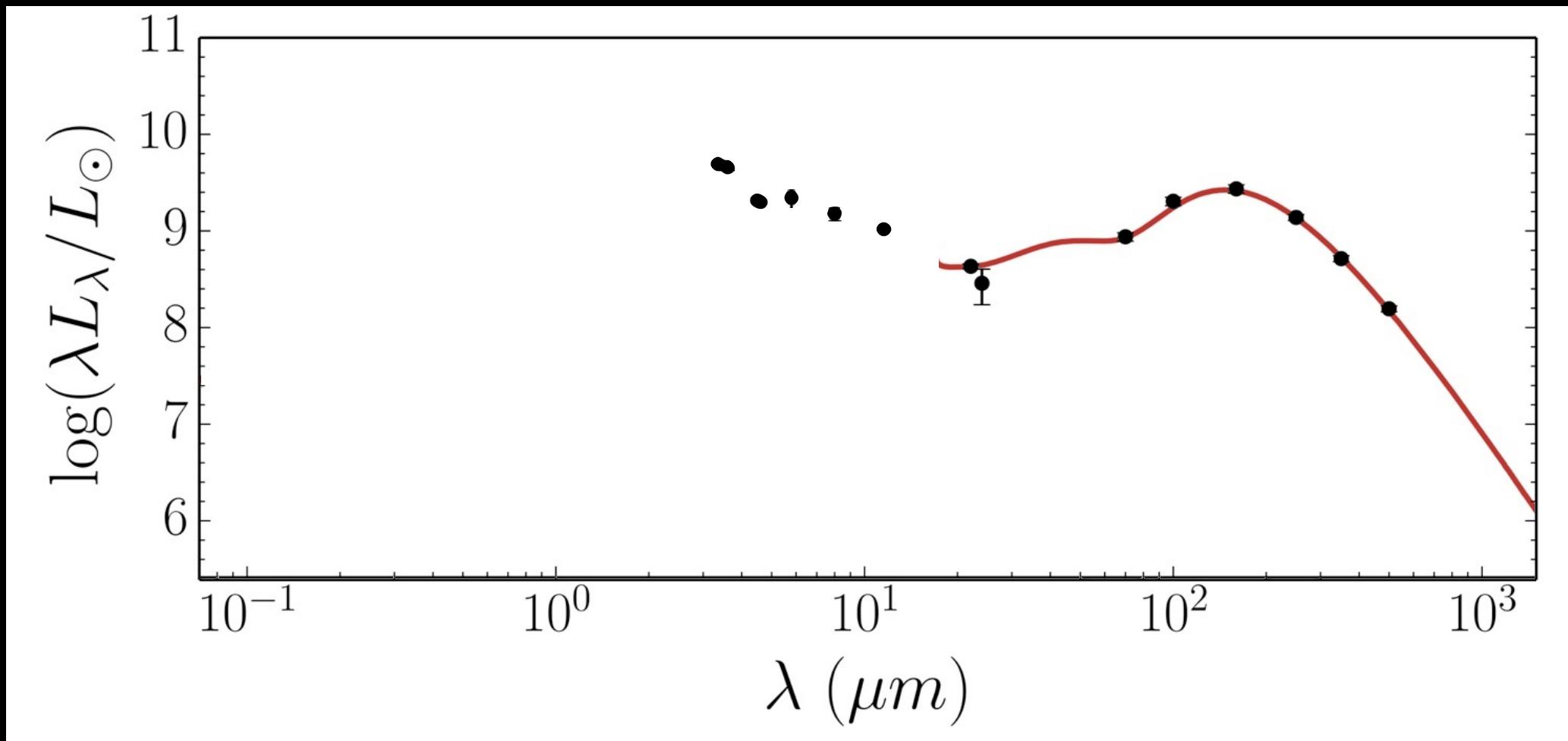


WISE 3.3 μm

T. Jarret, P. Barmby

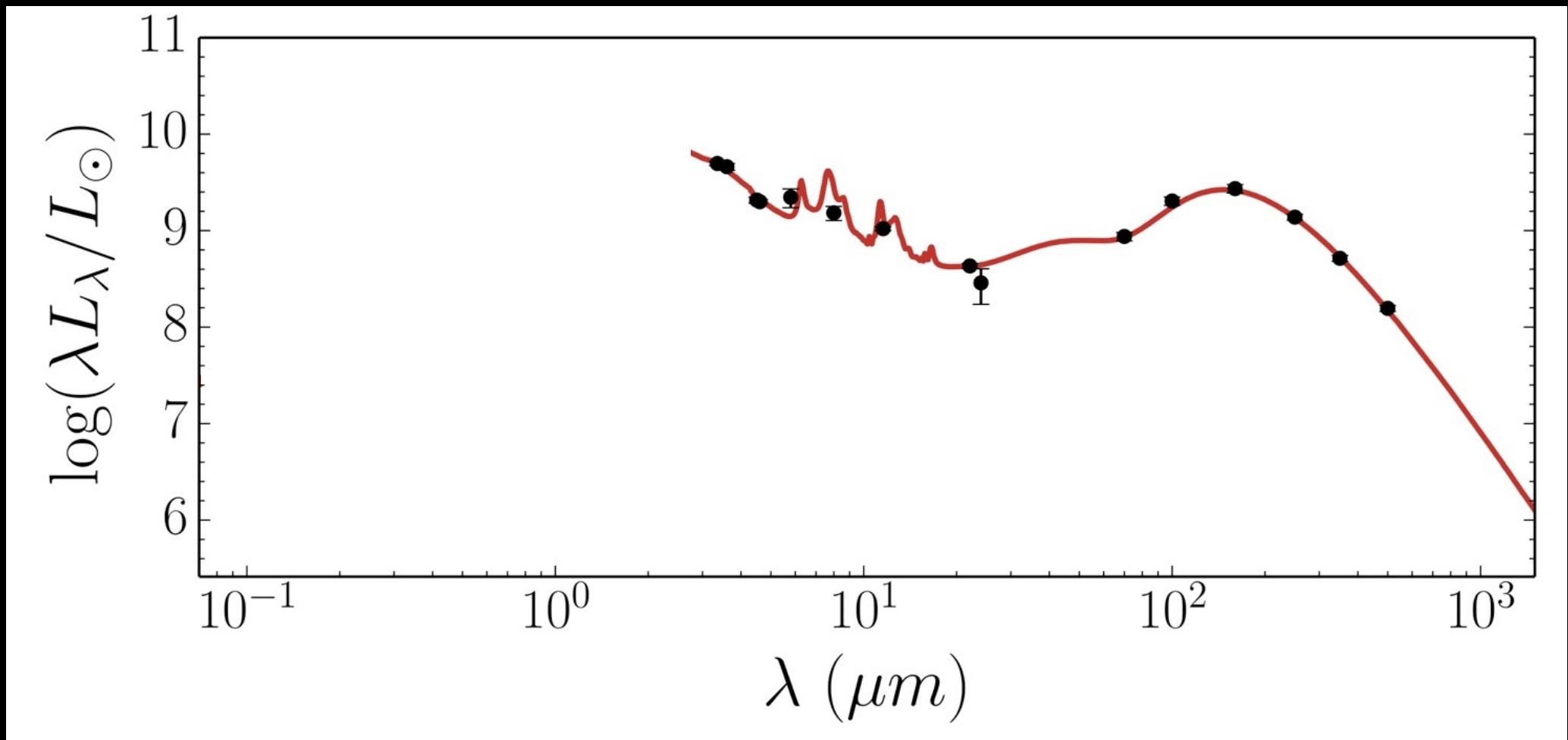
HELGA: MIR maps

> Hot dust / PAH + stellar emission



HELGA: MIR maps

> Hot dust / PAH + stellar emission



HELGA: Optical/UV



Composite *gri* (SDSS)

E.Tempel

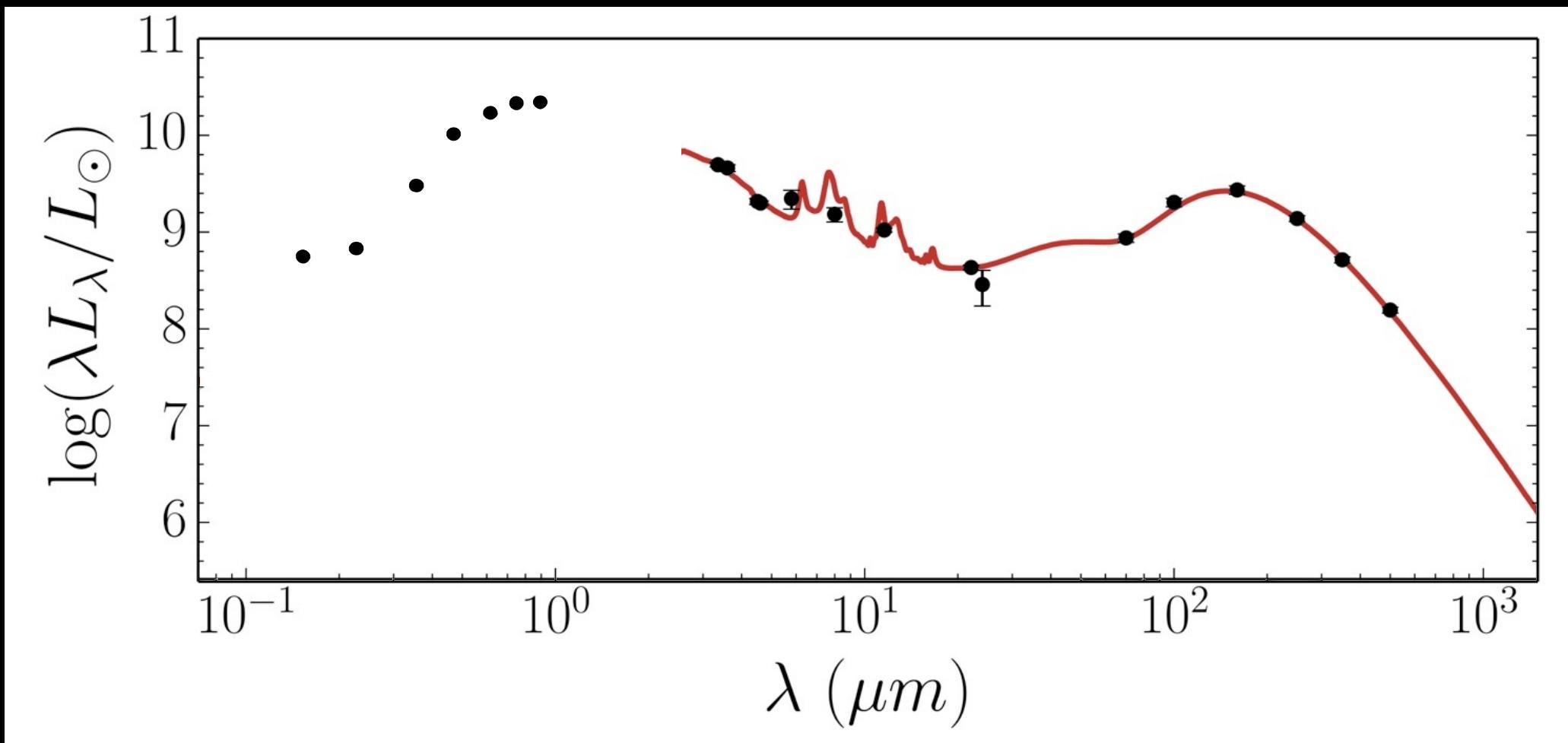


GALEX NUV

D.Thilker

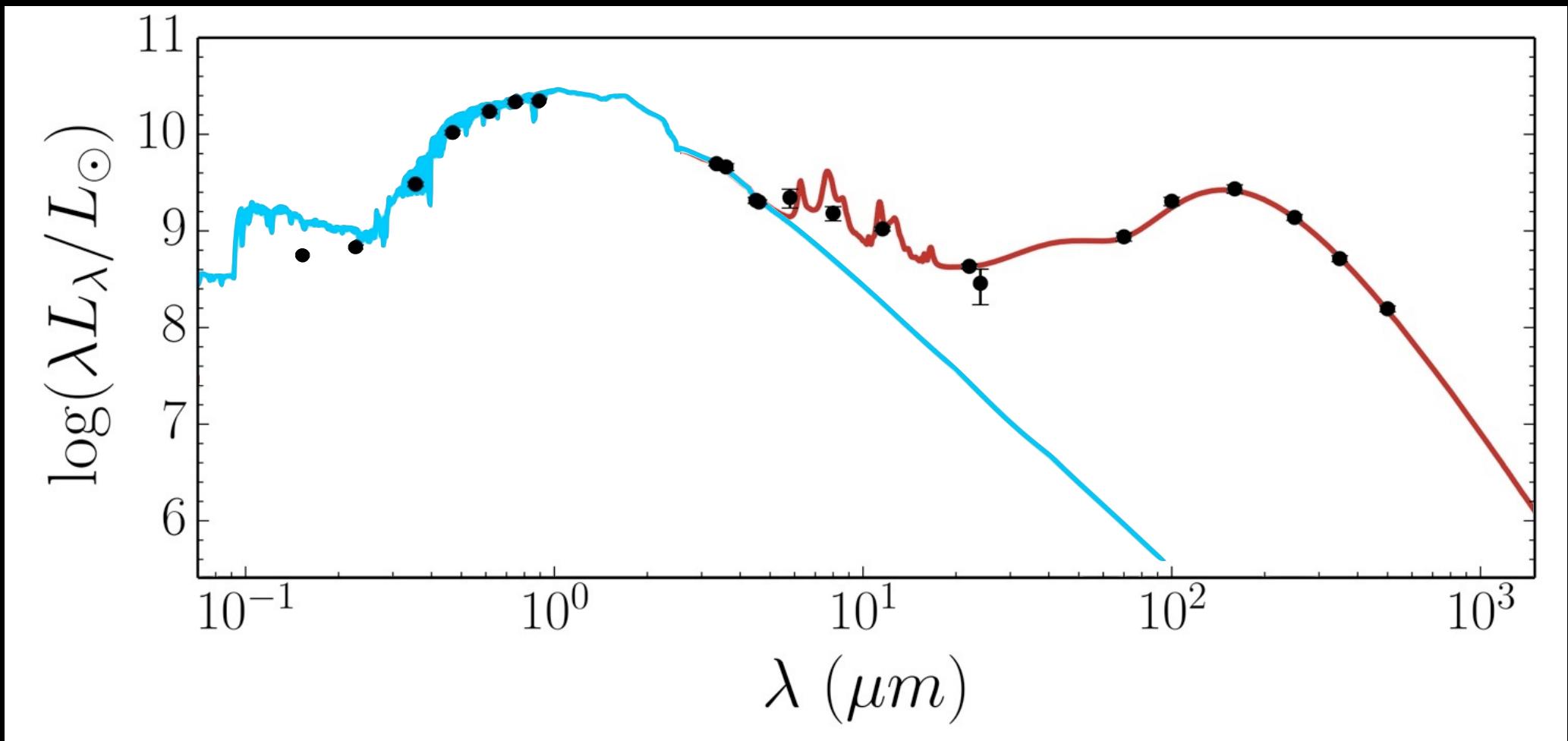
HELGA: Optical/UV

> Stellar emission



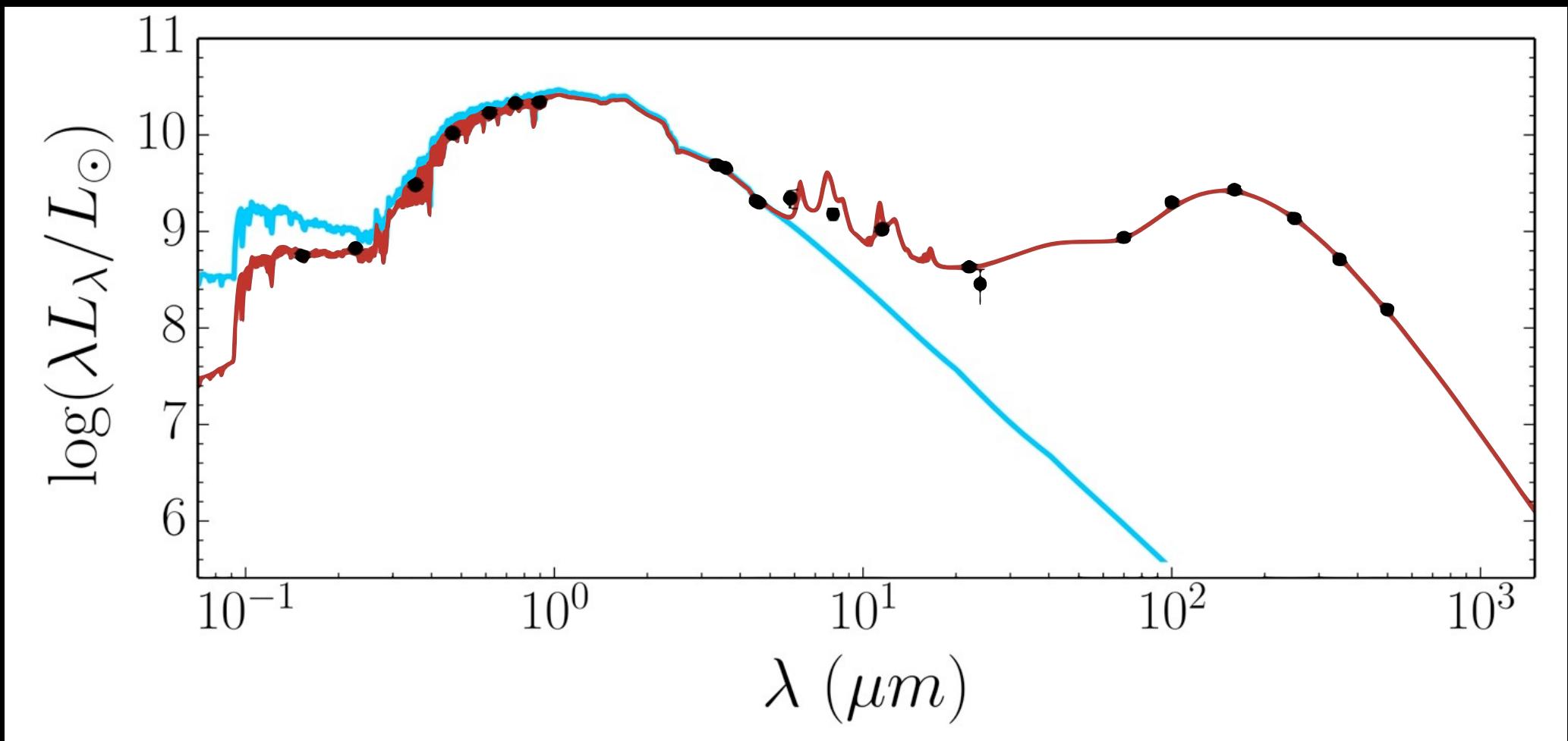
HELGA: Optical/UV

> Stellar emission (unattenuated)



HELGA: Optical/UV

> Stellar emission (attenuated)



HELGA: Zooming in

Pixel-by-pixel SED fitting

- > Masking foreground stars
- > Convolution to SPIRE 500 μm beam
- > Same pixel grid

Working resolution:
36'' \rightarrow 140 pc

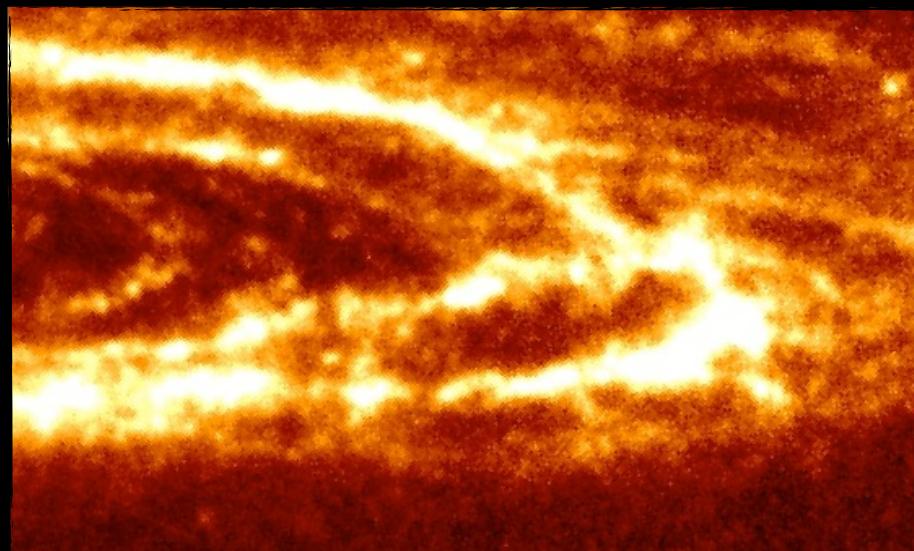


Resulting Images

NUV



500 μm

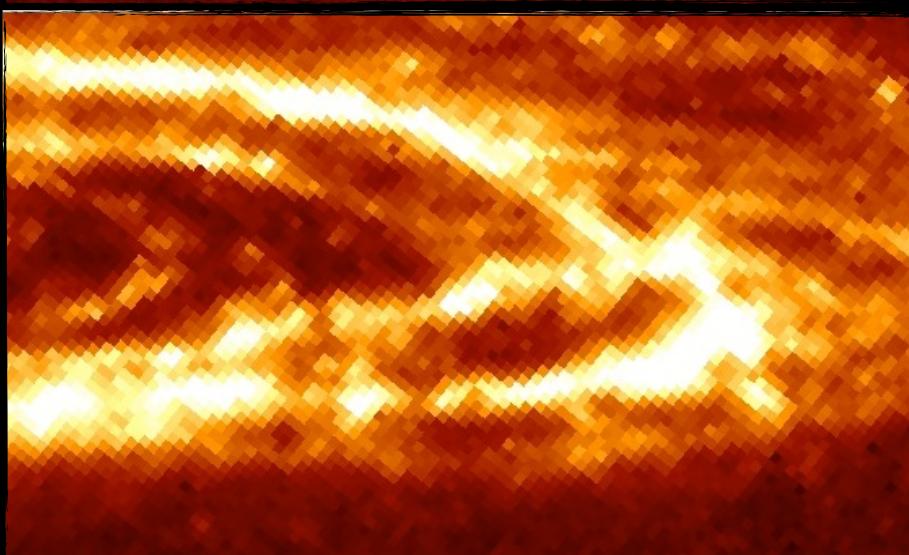
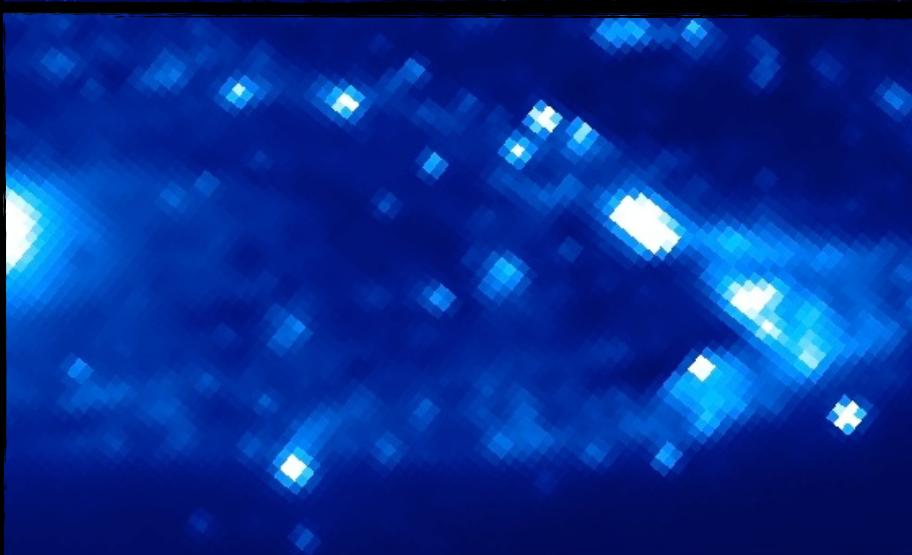
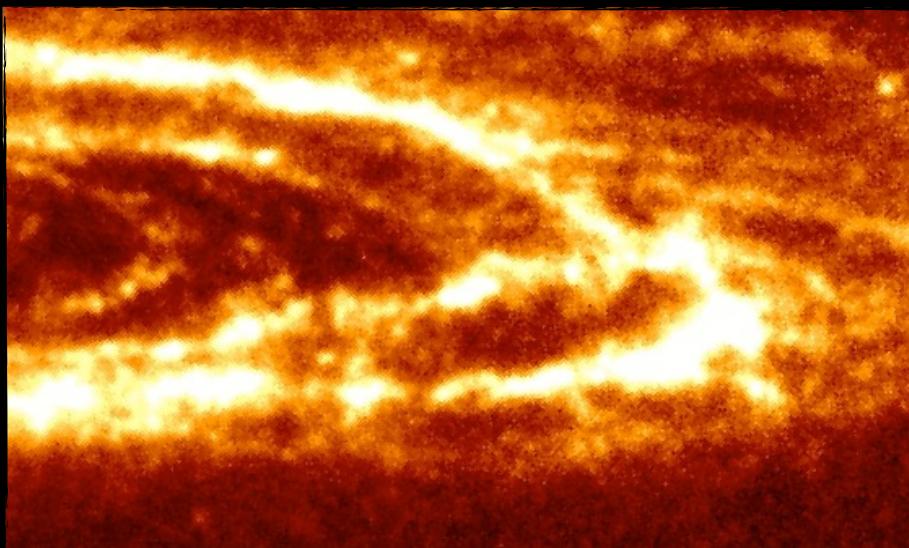


Resulting Images

NUV



500 μm

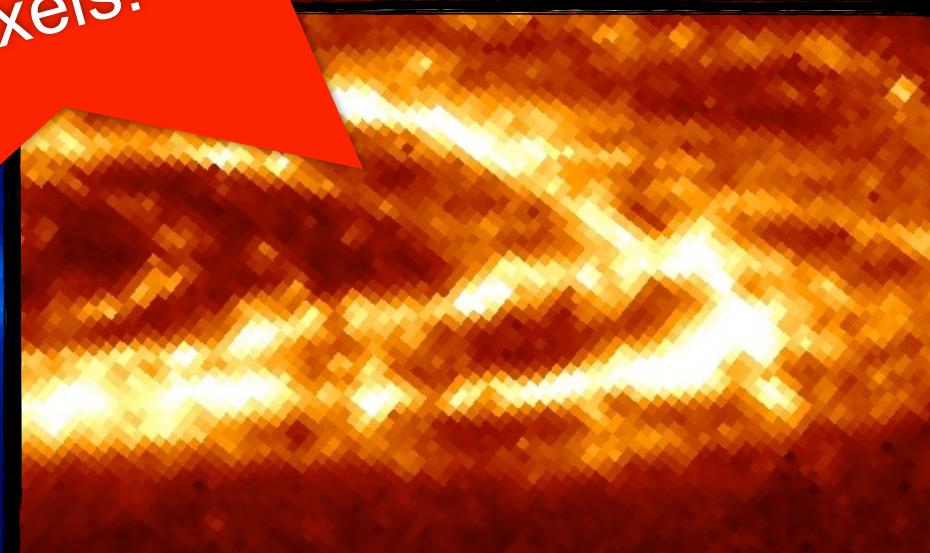
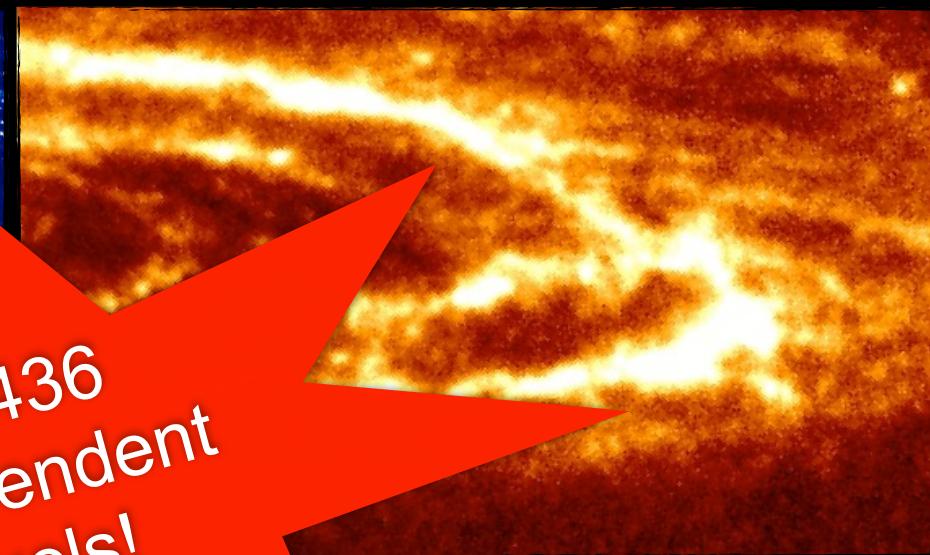


Resulting Images

NUV



500 μm



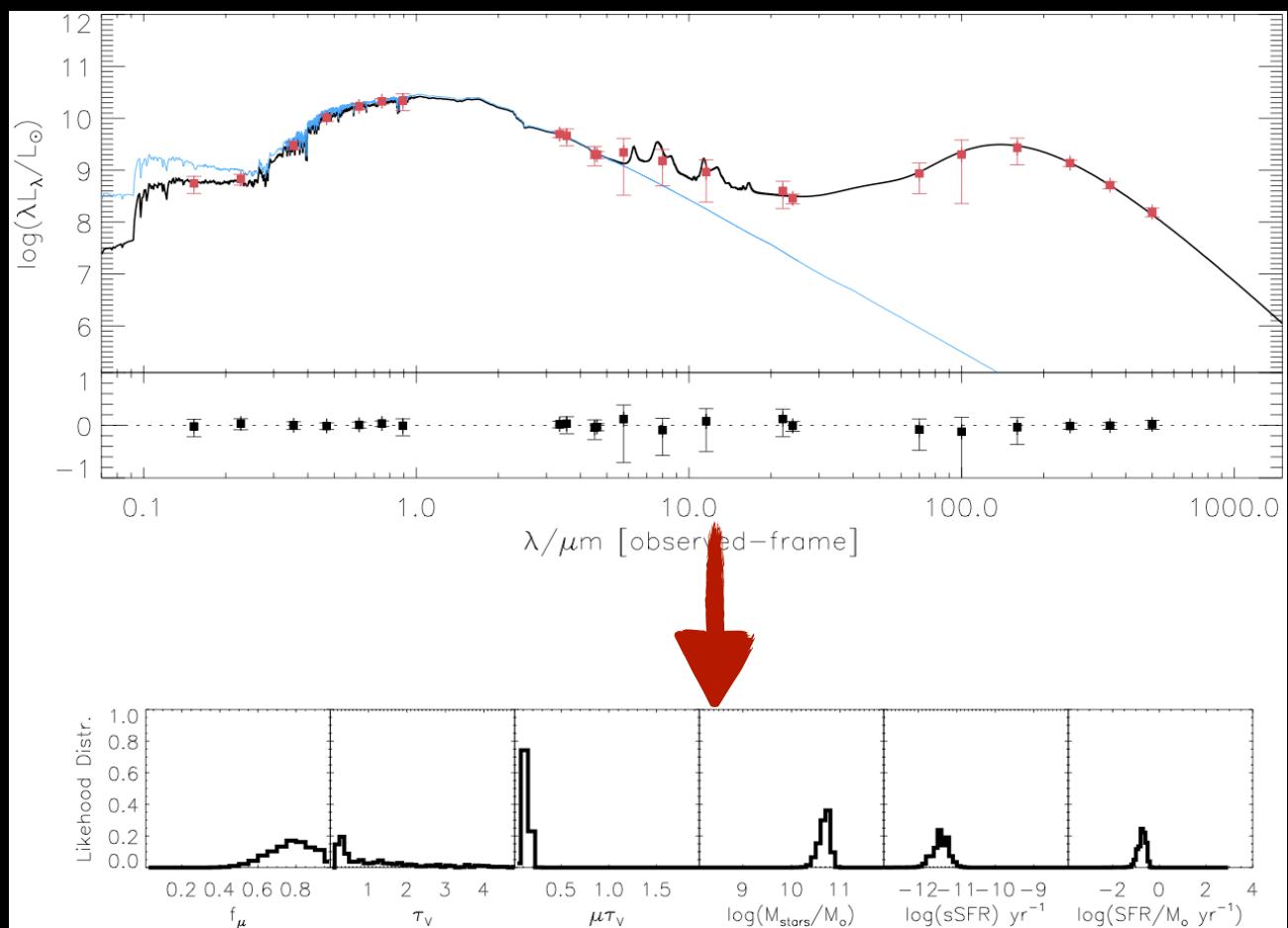
22 436
independent
pixels!

MAGPHYS: SED fitting

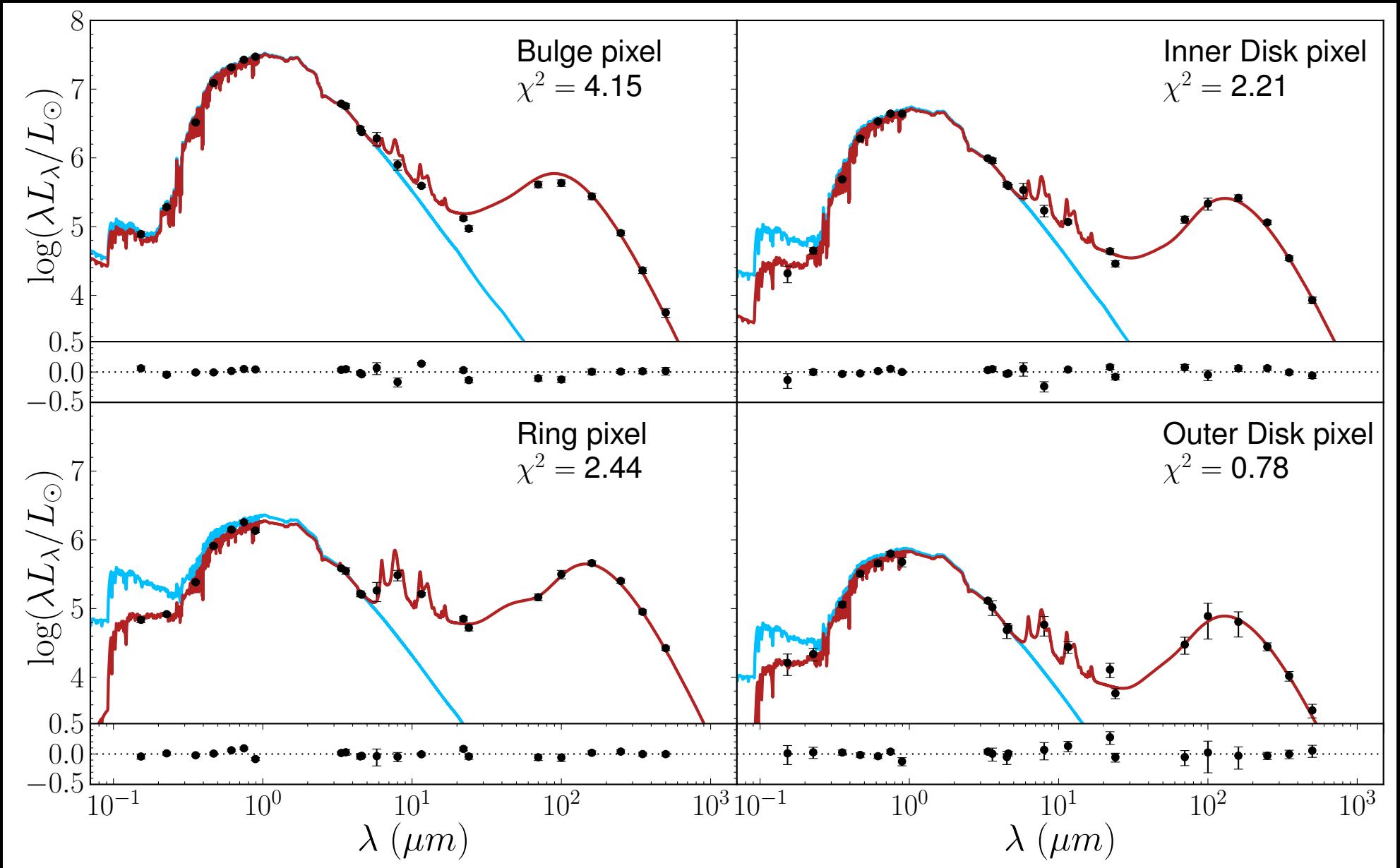
Multi-wavelength Analysis of Galaxy PHYSical properties

E. da Cunha et al. 2008

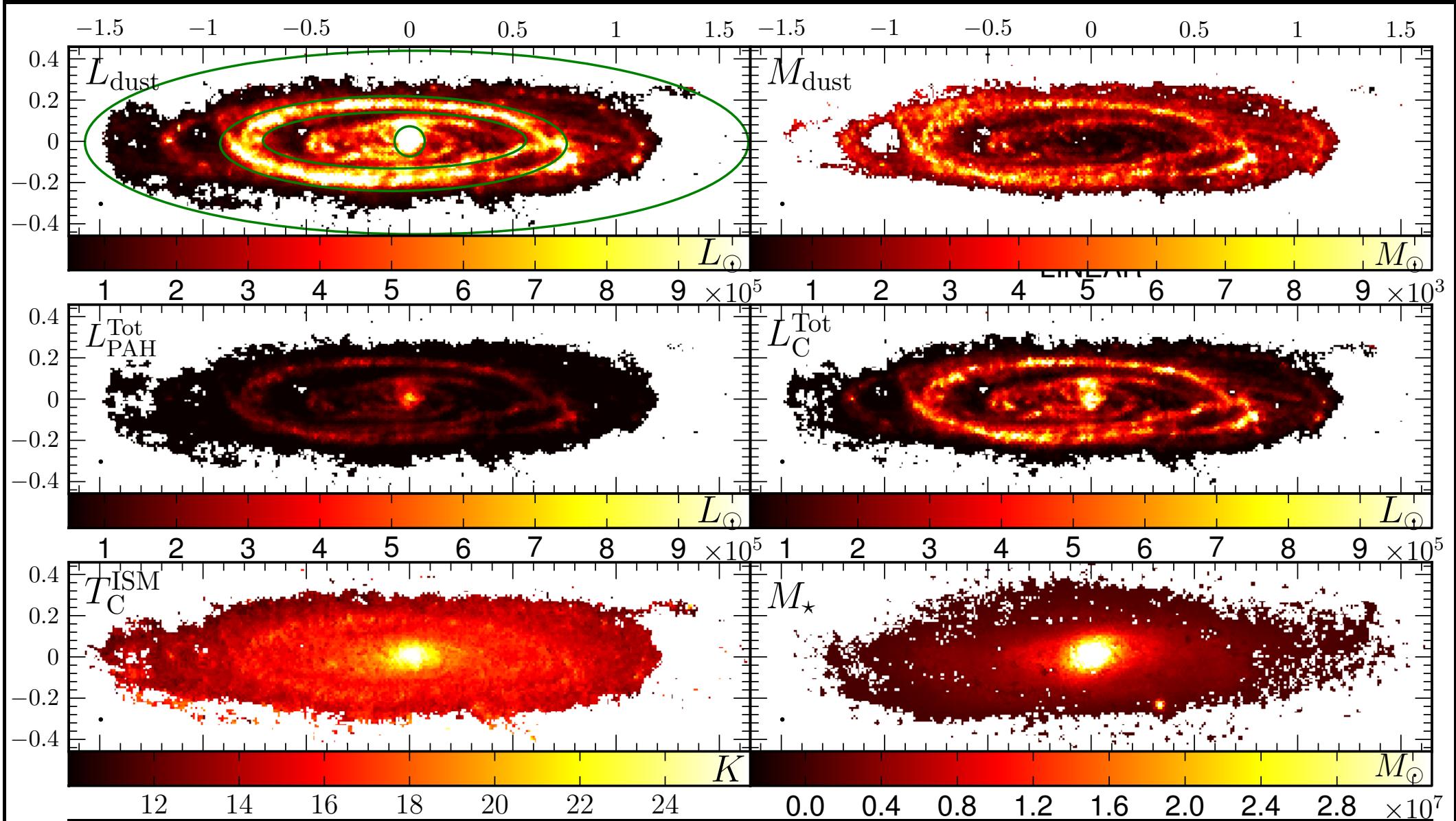
- > Bayesian SED fits
- > 75000 theoretical SEDs
- > Construct Probability Density Functions (PDFs)



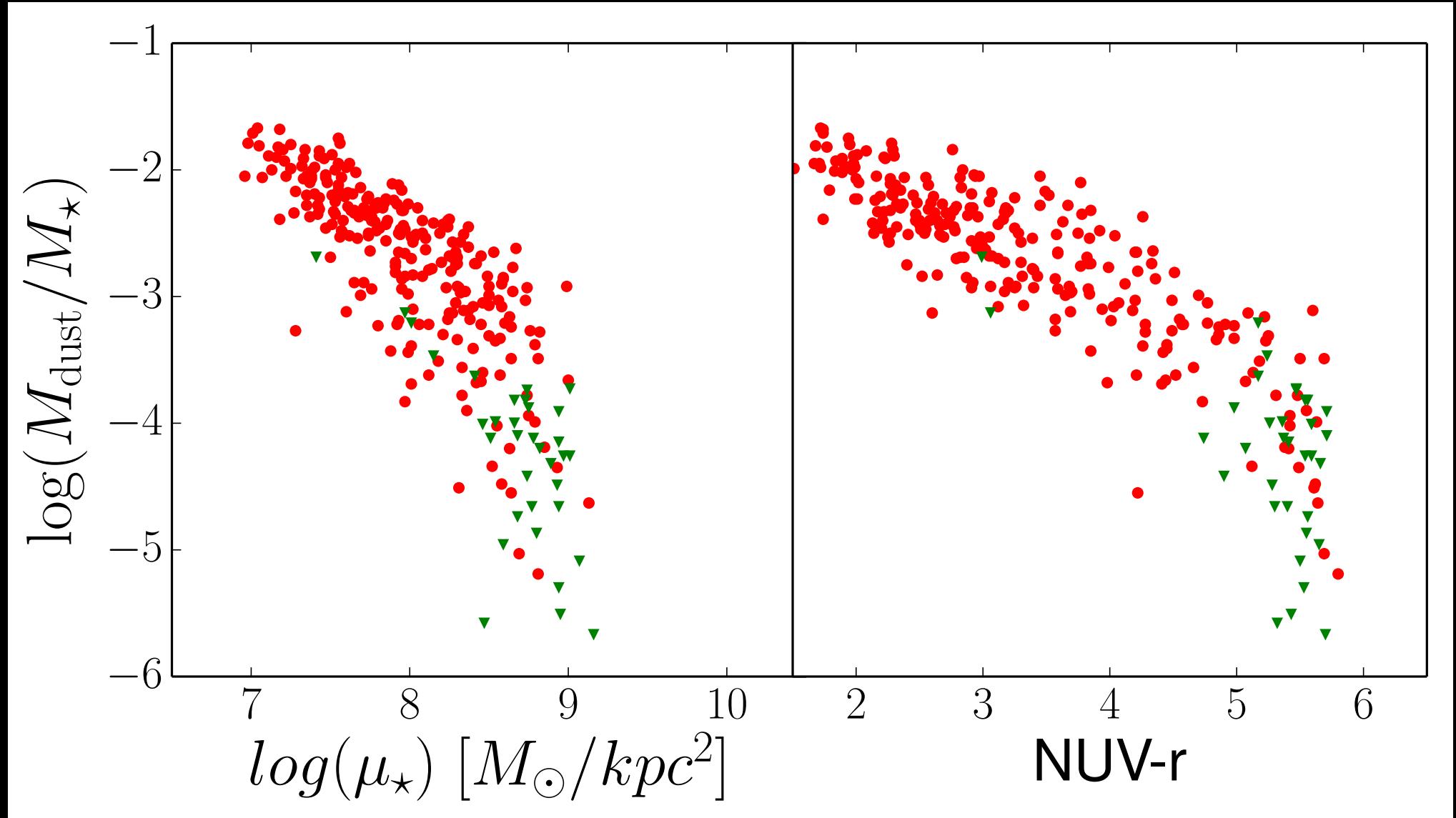
M31: Main Regions



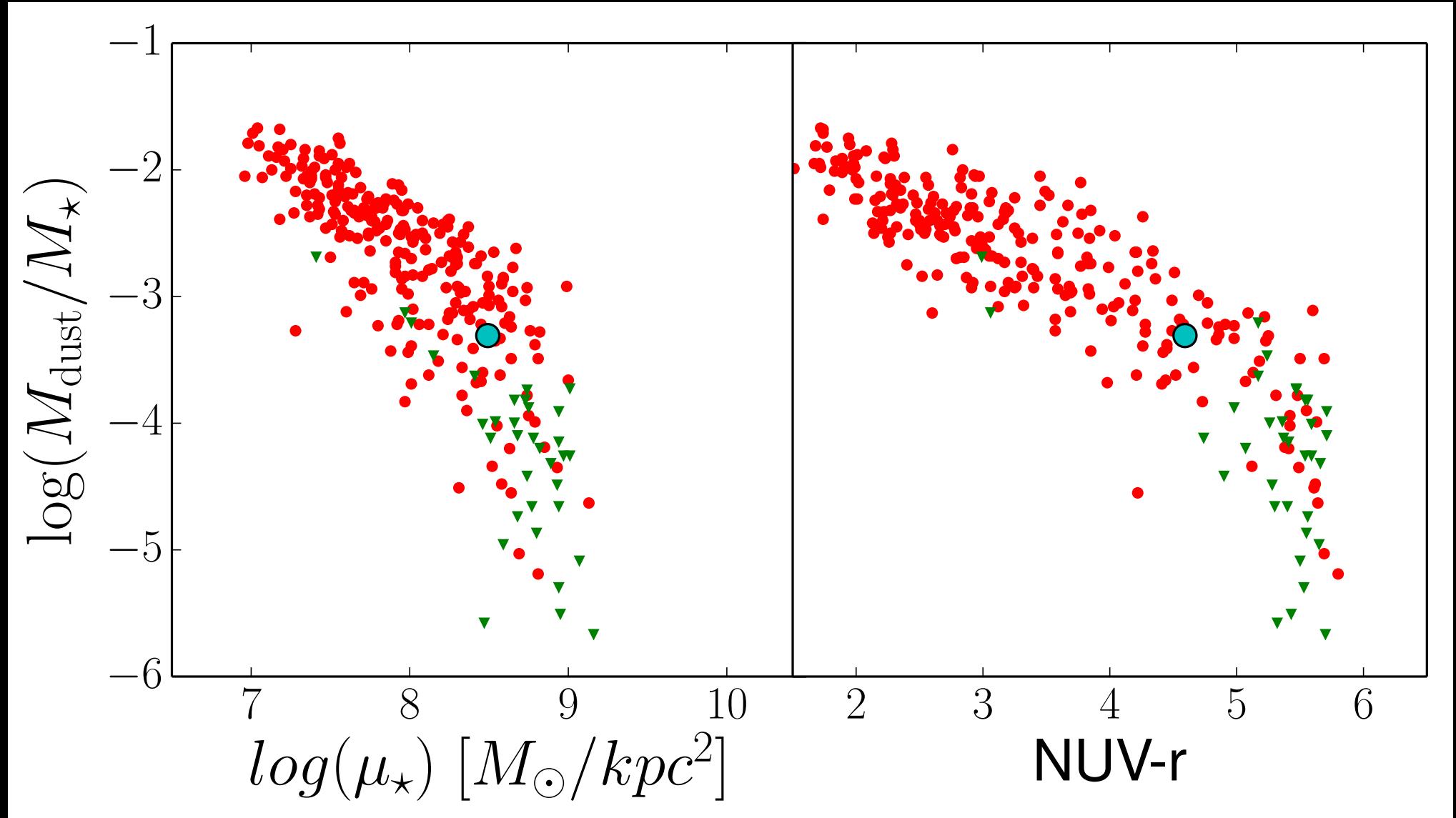
M31: Parameter maps



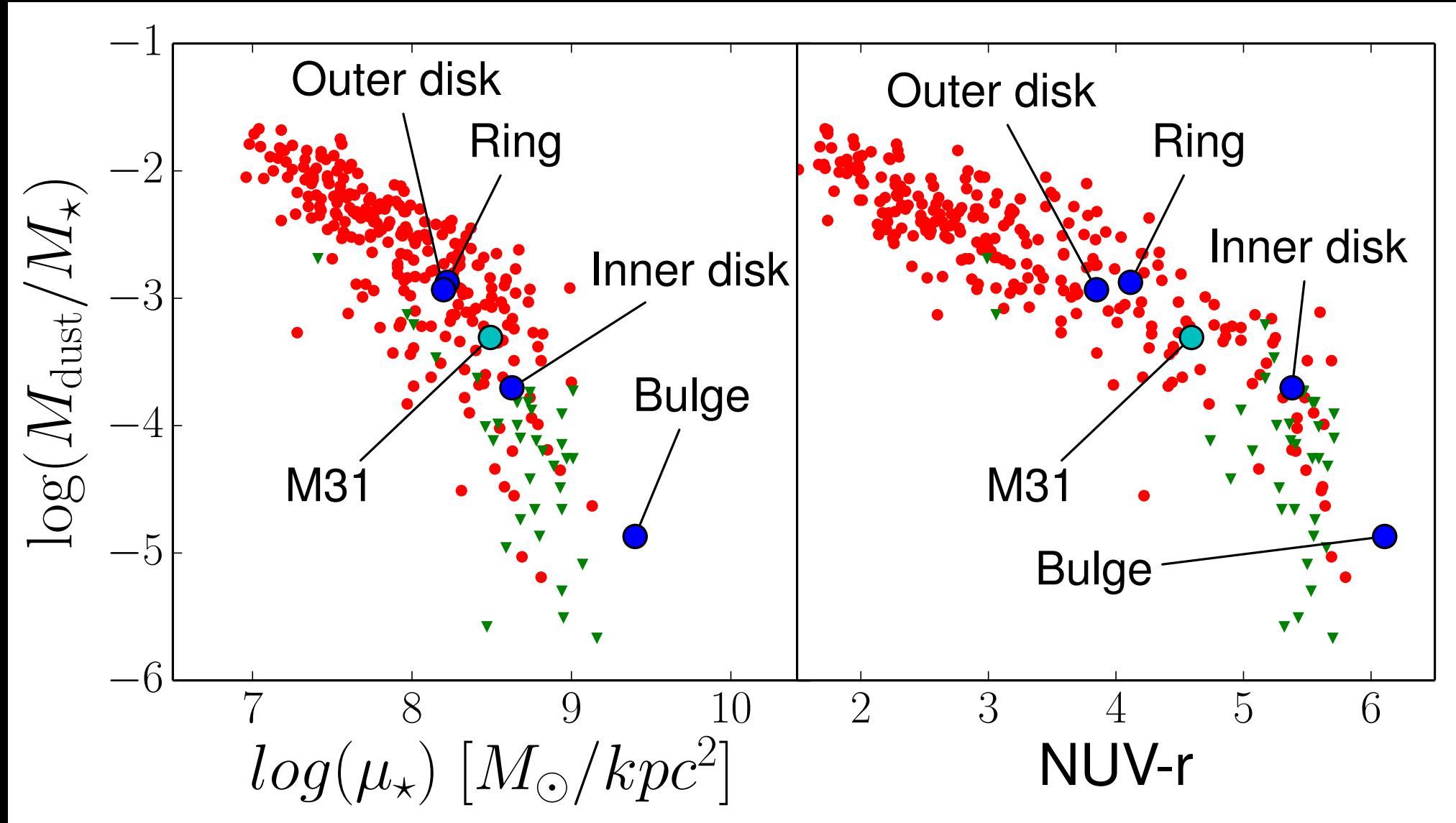
HRS: Dust scaling relations



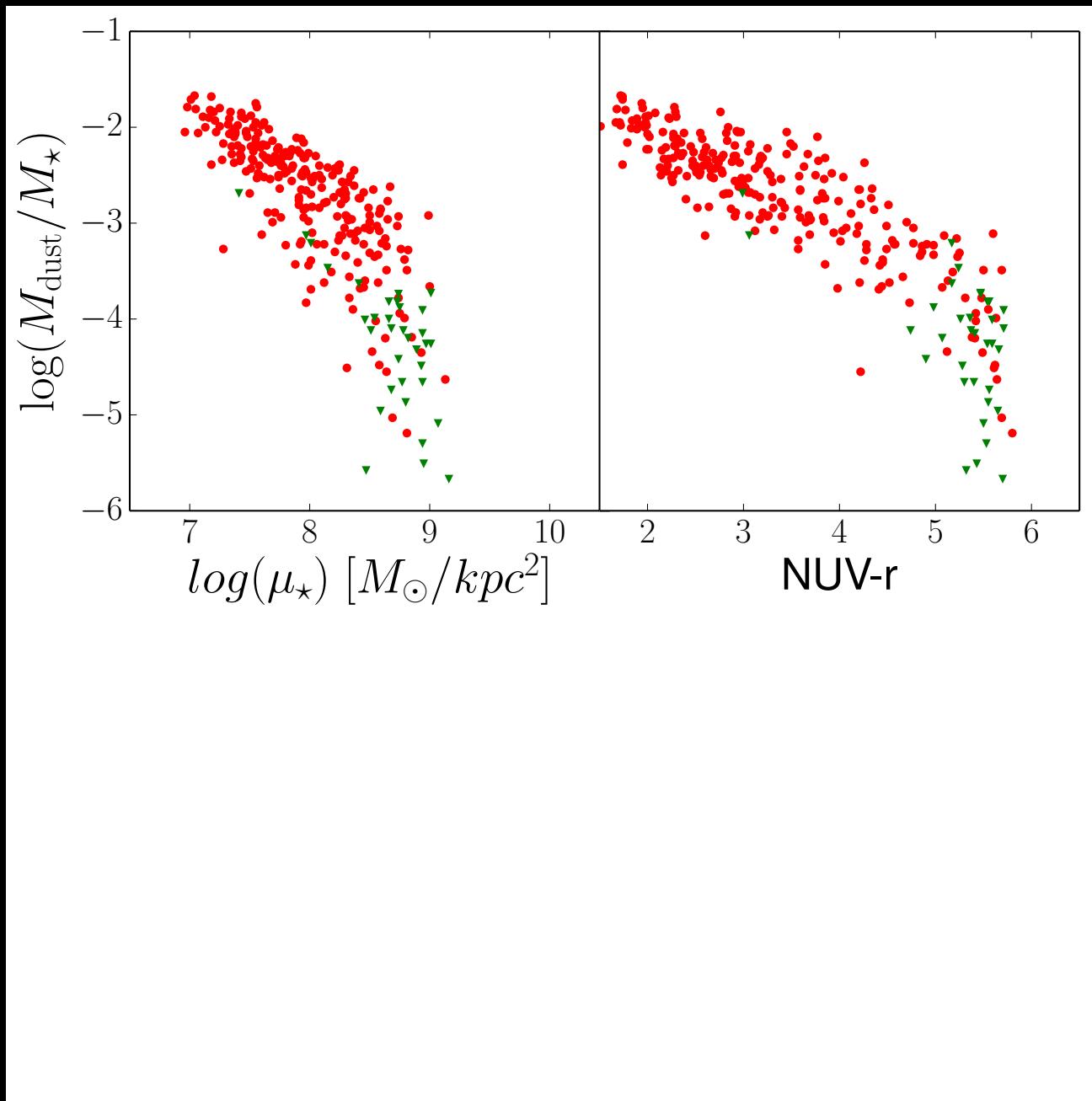
HR_S: Dust scaling relations



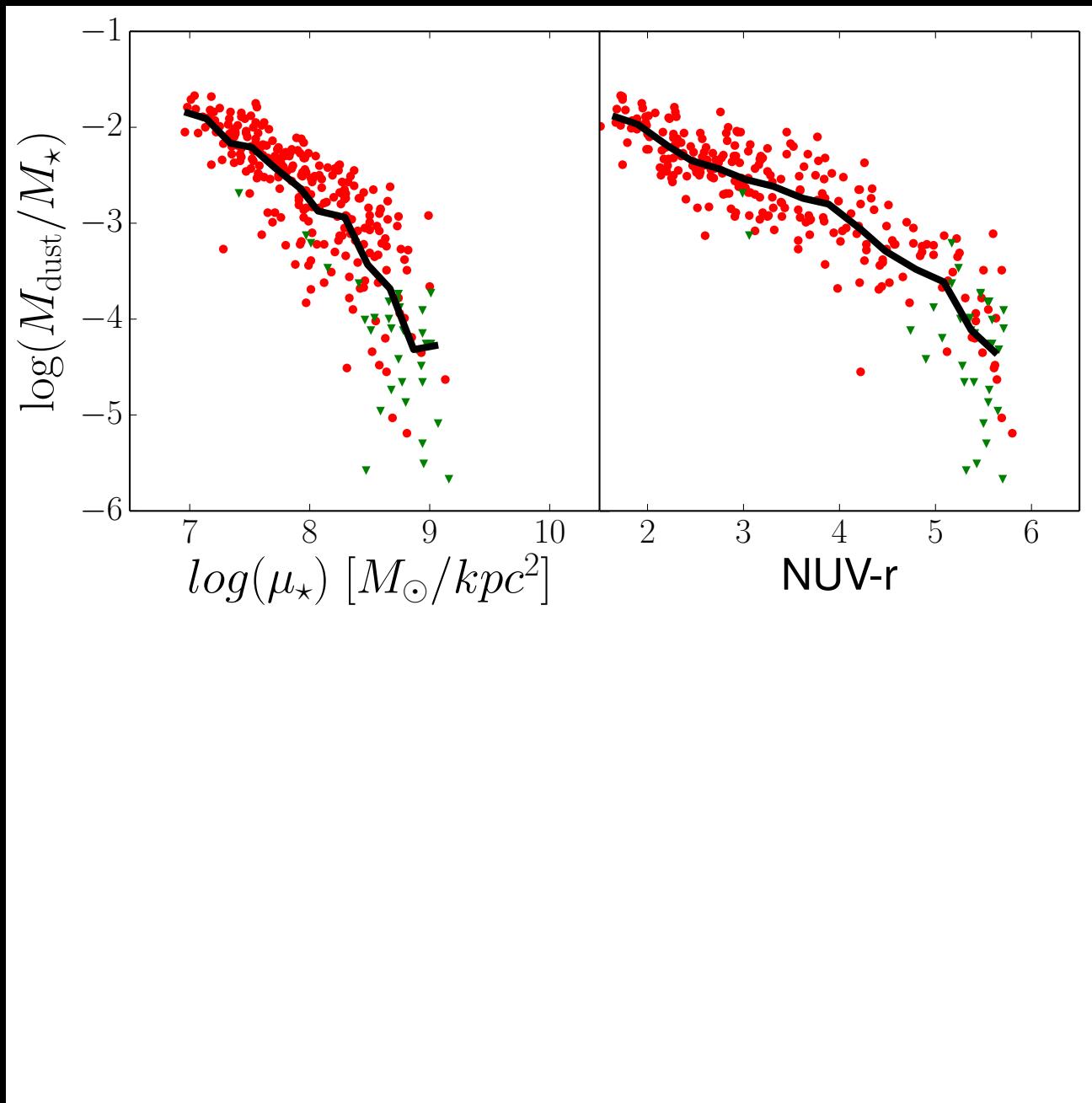
HRS: Dust scaling relations



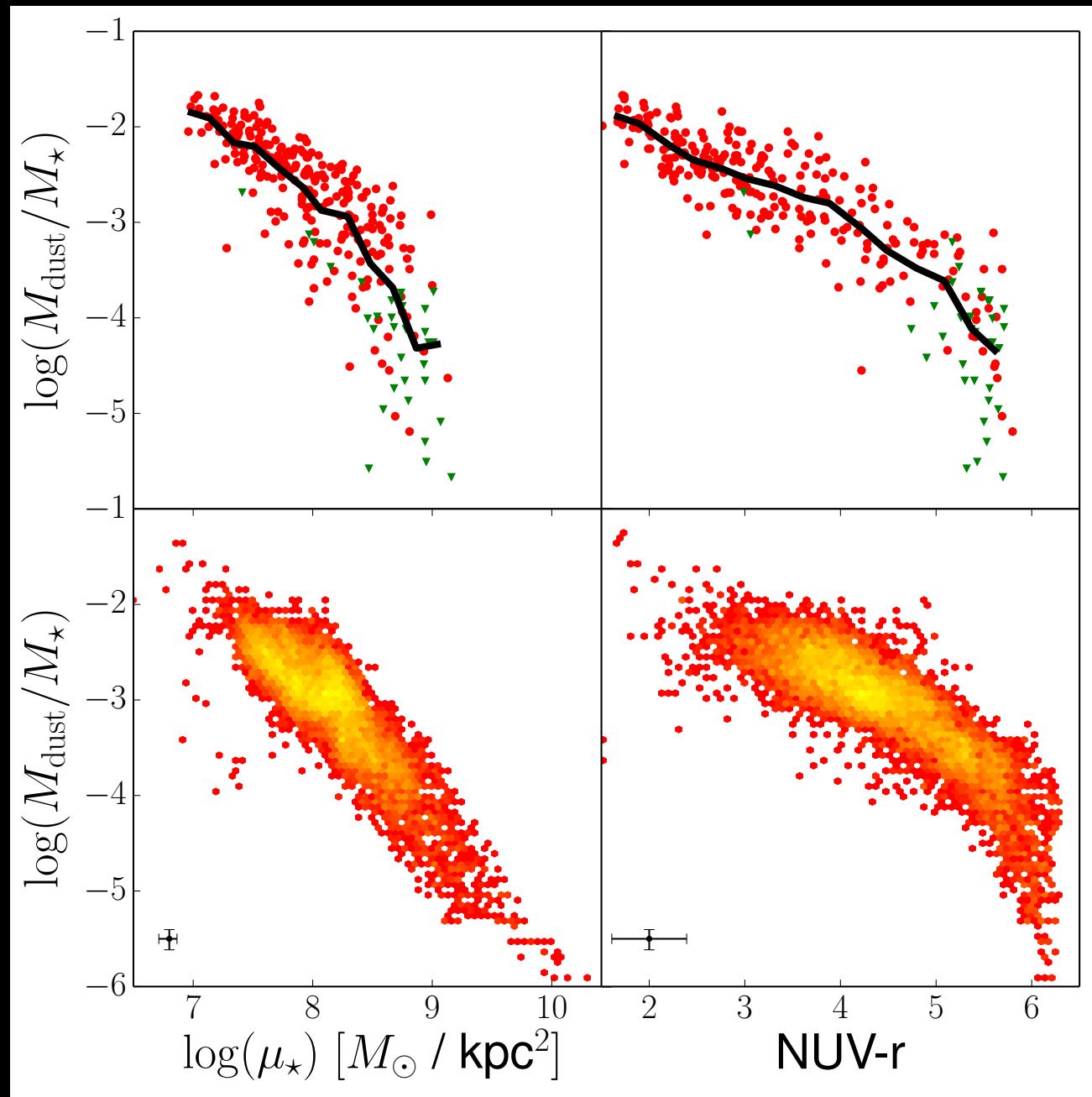
HRS: Dust scaling relations



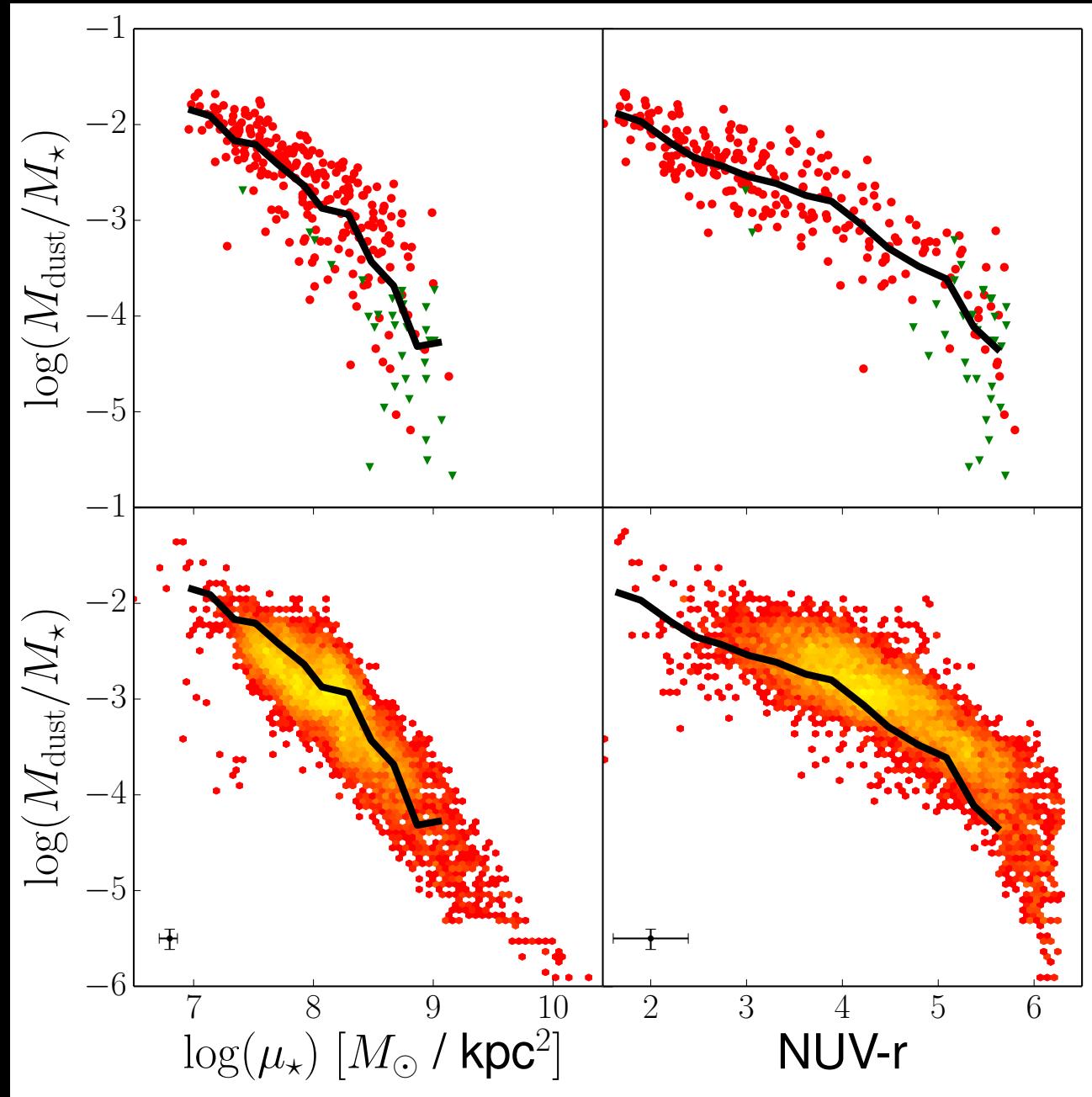
HRS: Dust scaling relations



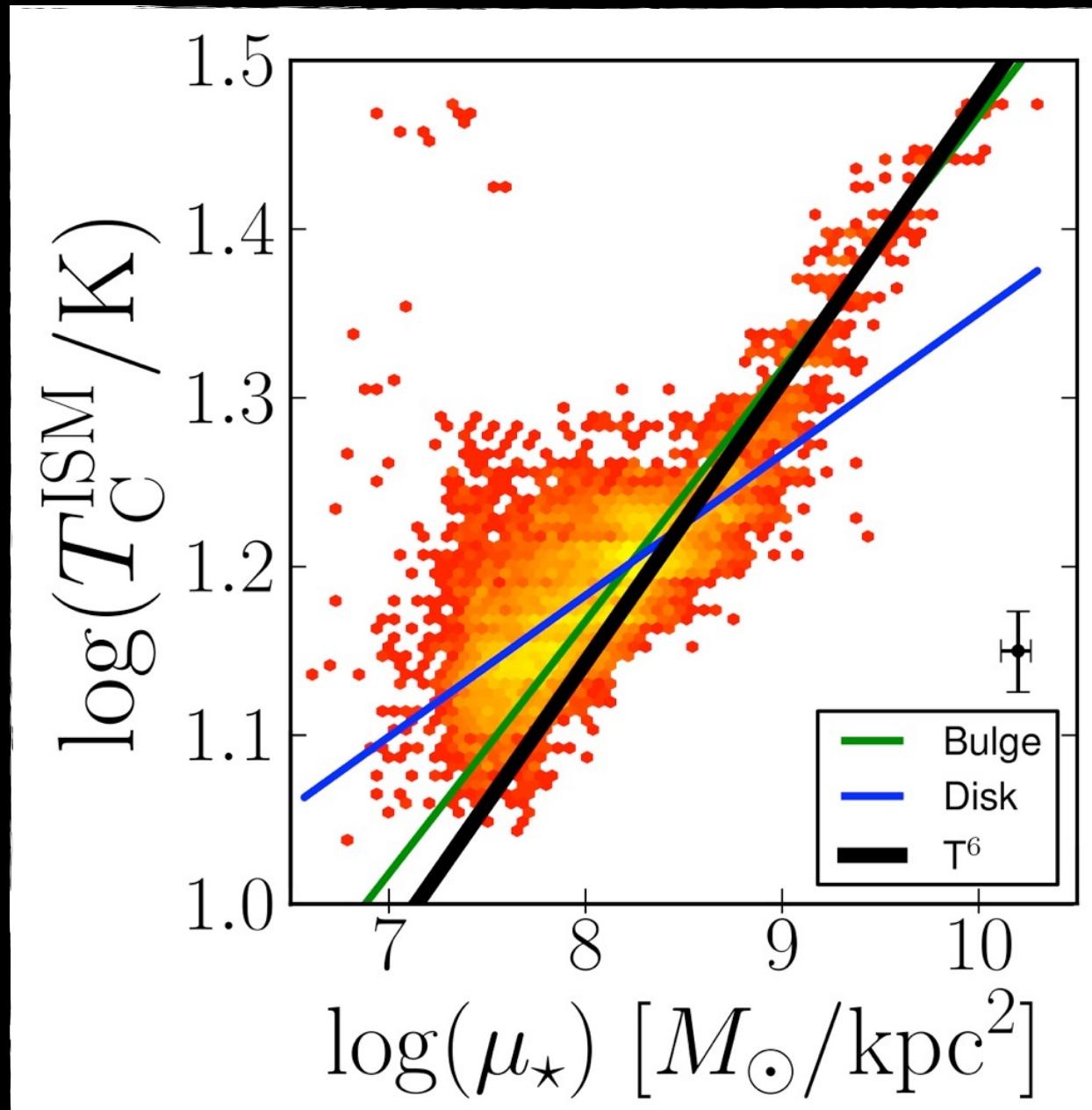
M31: Dust scaling relations



M31: Dust scaling relations



M31: Dust heating sources



M31: Dust Scaling Relations

In Summary

- > Panchromatic, sub-kpc SED modelling is now possible,
BUT requires:
 - Special data treatment (masking, convolution,...)
 - Extended parameter space
- > Resolved maps - 140 pc - of stellar and dust properties
- > Sub-kpc regions follow galaxy-galaxy dust scaling
relations; local nature of the underlying processes