Unveiling the intrinsic AGN strength in a 12 micron-selected Seyfert 2 sample

F. Salvestrini[1,2], C. Vignali[1,2], C. Gruppioni[2], F. Pozzi[1]

[1] DiFA - Università di Bologna, [2] INAF - OAS Bologna

The effect of AGN activity on the ISM properties

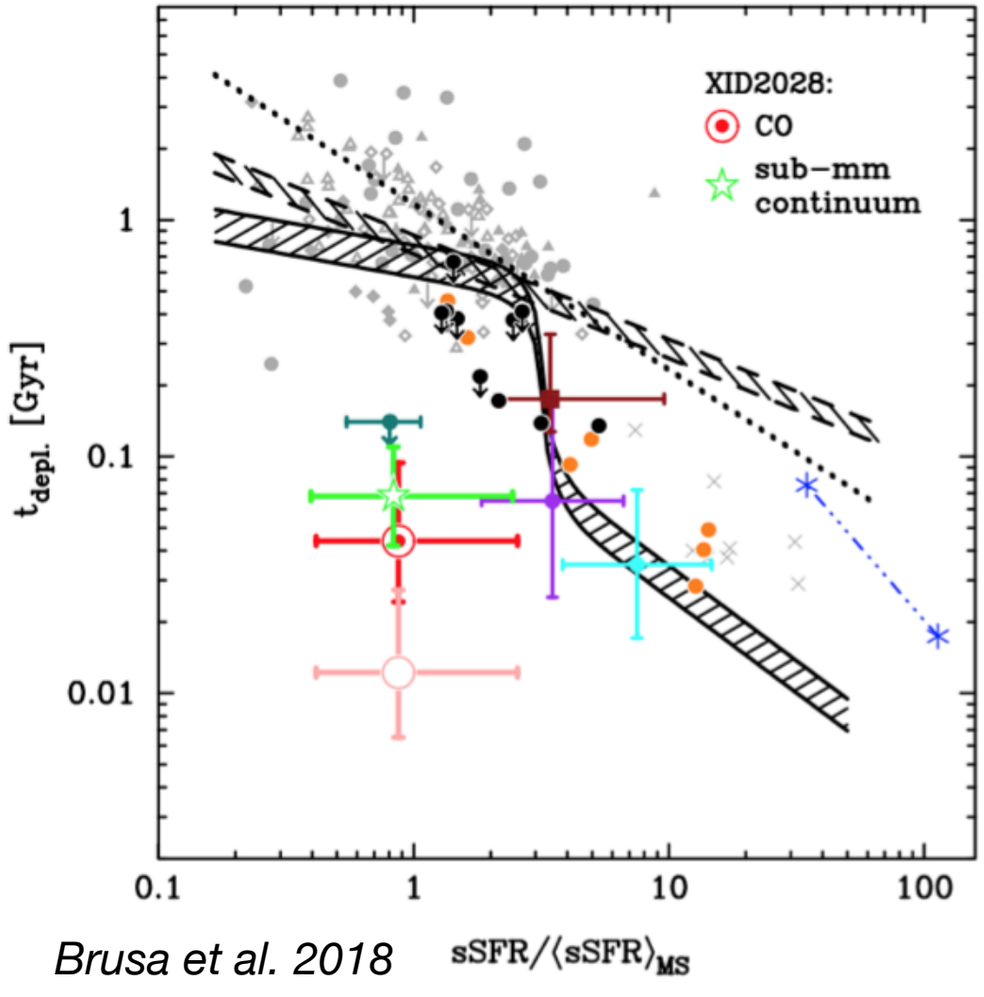
Proper characterisation of the AGN intrinsic power

Study of the different components of the host galaxy ISM (e.g., dust, molecular gas)

The effect of AGN activity on the ISM properties

Proper characterisation of the AGN intrinsic power

Study of the different components of the host galaxy ISM (e.g., dust, molecular gas)



Brusa et al. 2018

Role of AGN feedback?

The effect of AGN activity on the ISM properties

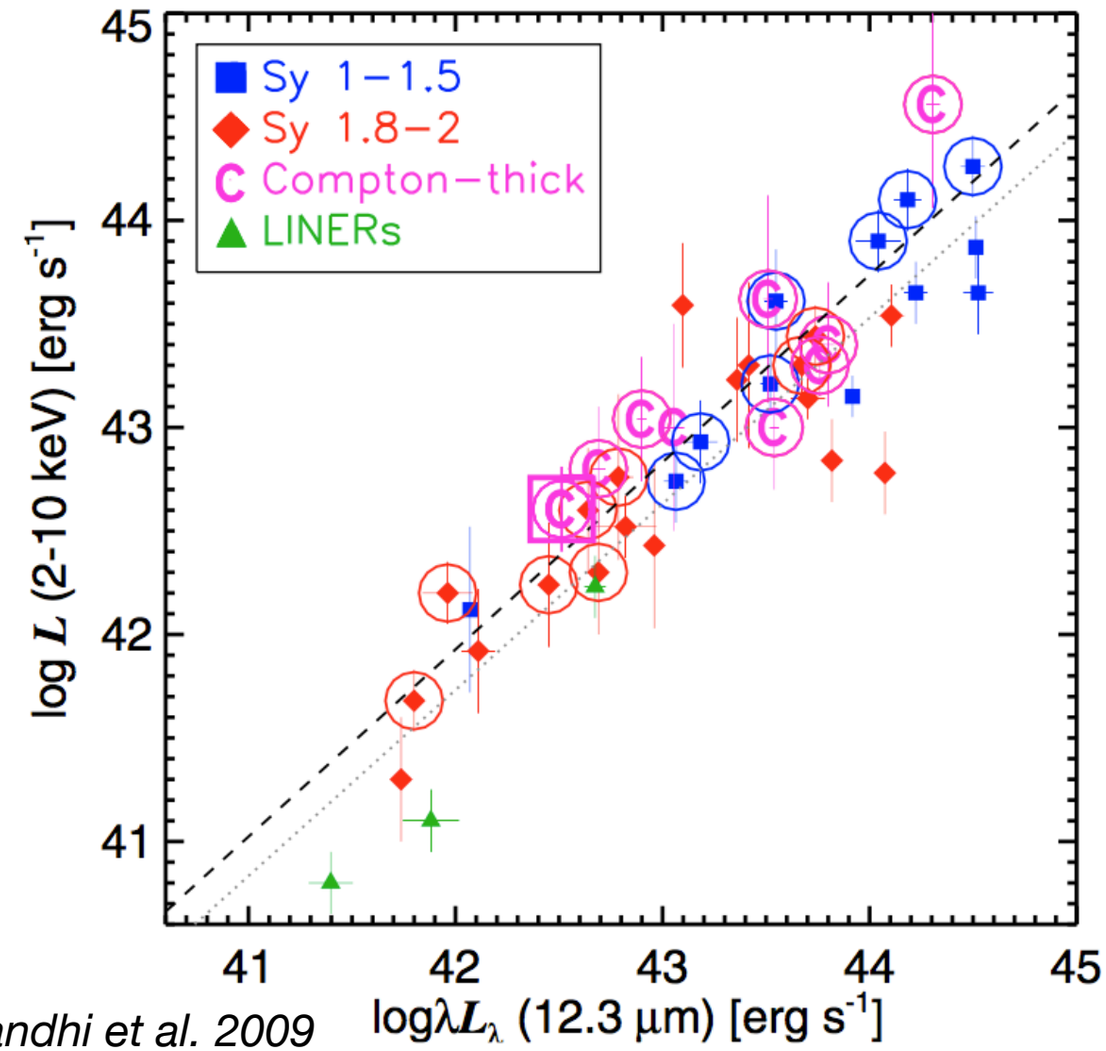
Proper characterisation of the AGN intrinsic power

Difficult in the case of obscuration and/or weak emission, then…

Multi-wavelength strategy

X-rays + mid-IR

Study of the different components of the host galaxy ISM (e.g., dust, molecular gas)



Gandhi et al. 2009

X-rays + IR

- Constraining the torus model parameters by combining the information from different bands.

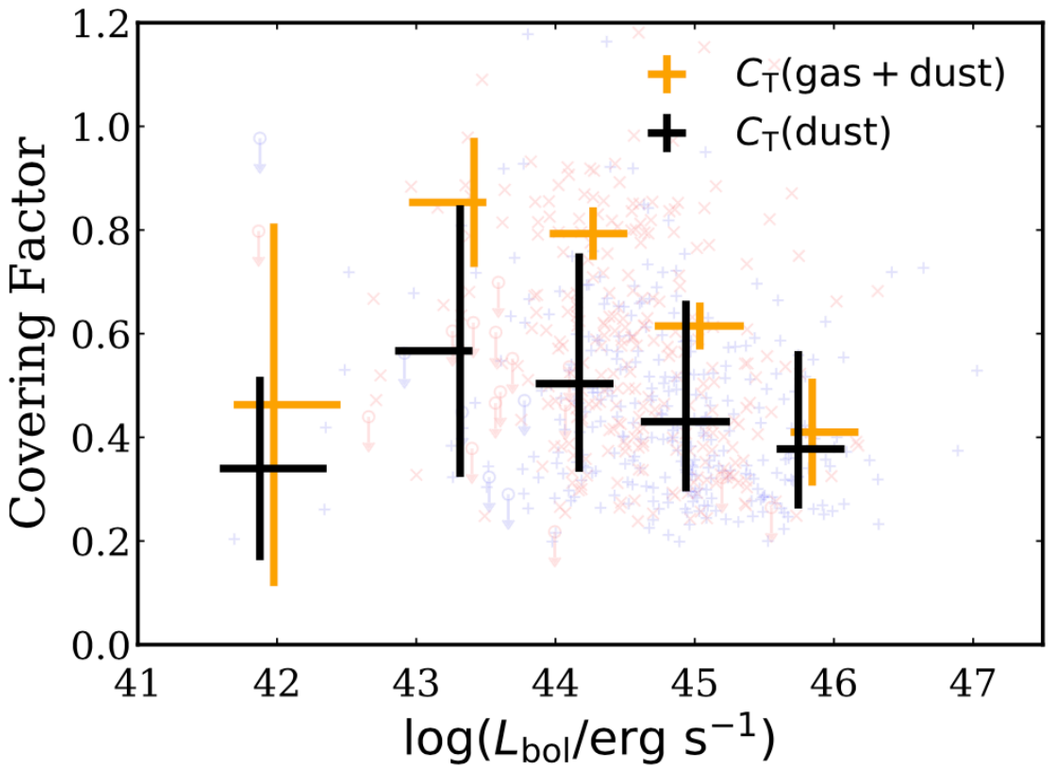
Poster #407 Mateos *Poster #415 Esparza-Arredondo*

X-rays + IR

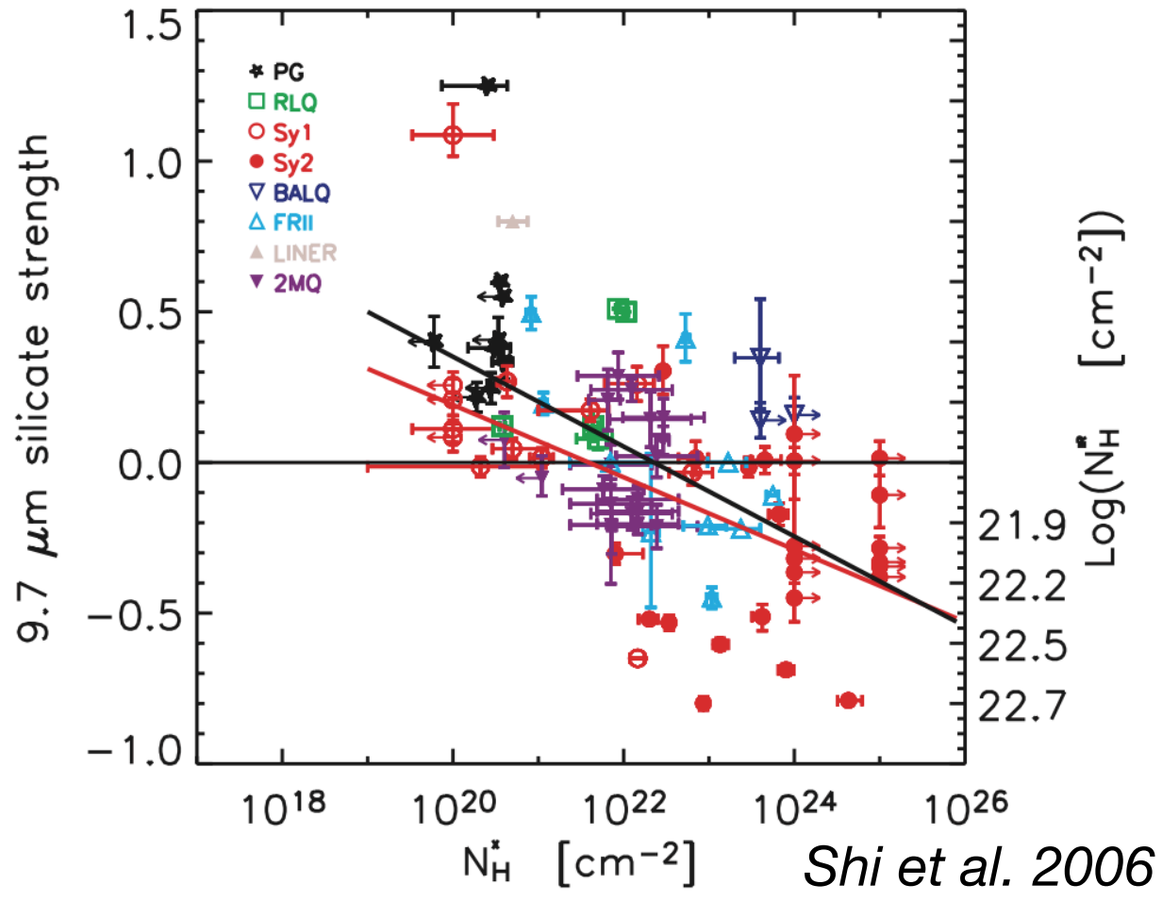
- Constraining the torus model parameters by combining the information from different bands.

Poster #407 Mateos *Poster #415 Esparza-Arredondo*

- Comparison torus properties from different bands.



Ichikawa et al. 2019



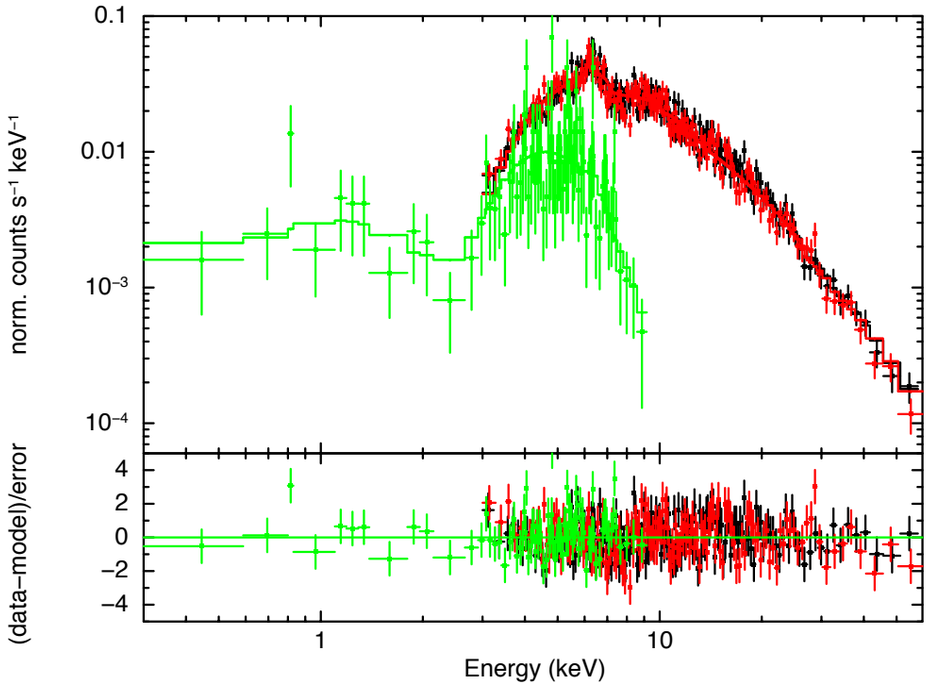
Shi et al. 2006

12MGS

Rush, Malkan & Spinoglio 1993

12MGS

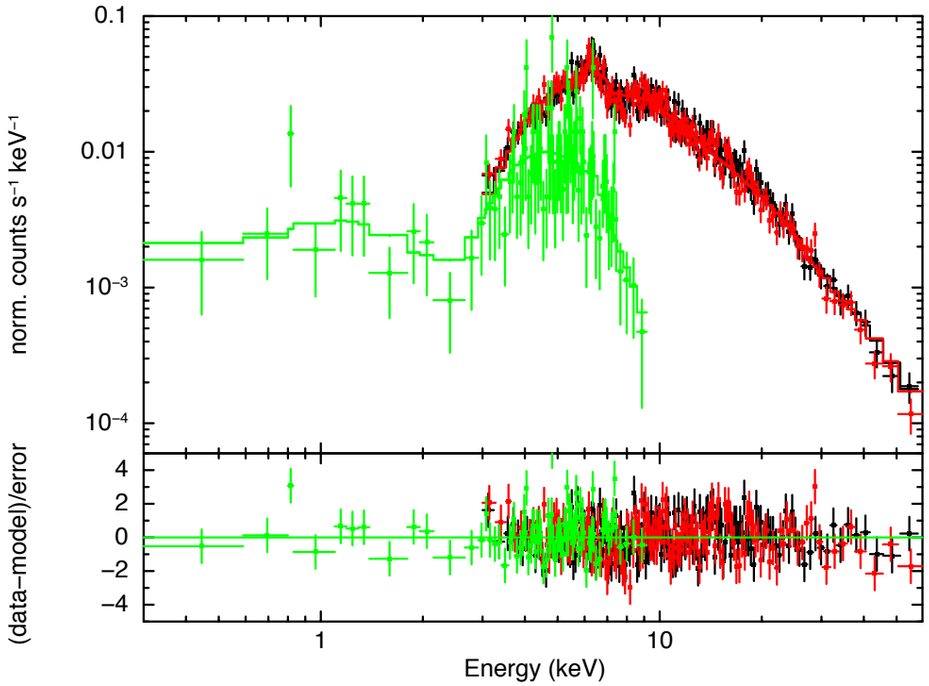
X-rays: spectra from (~0.5-35 keV)



Salvestrini et al. in prep.

12MGS

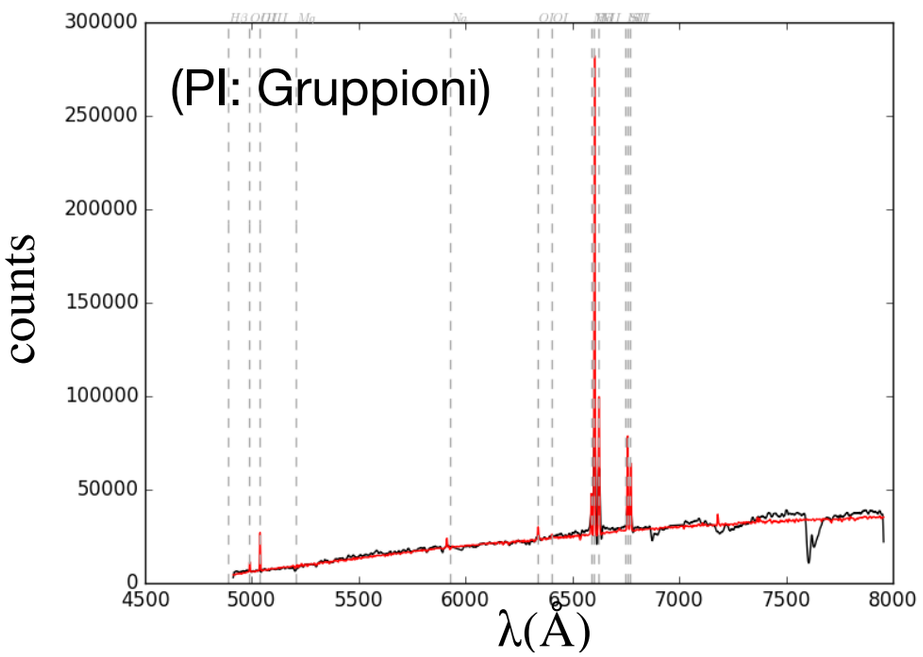
X-rays: spectra from (~0.5-35 keV)



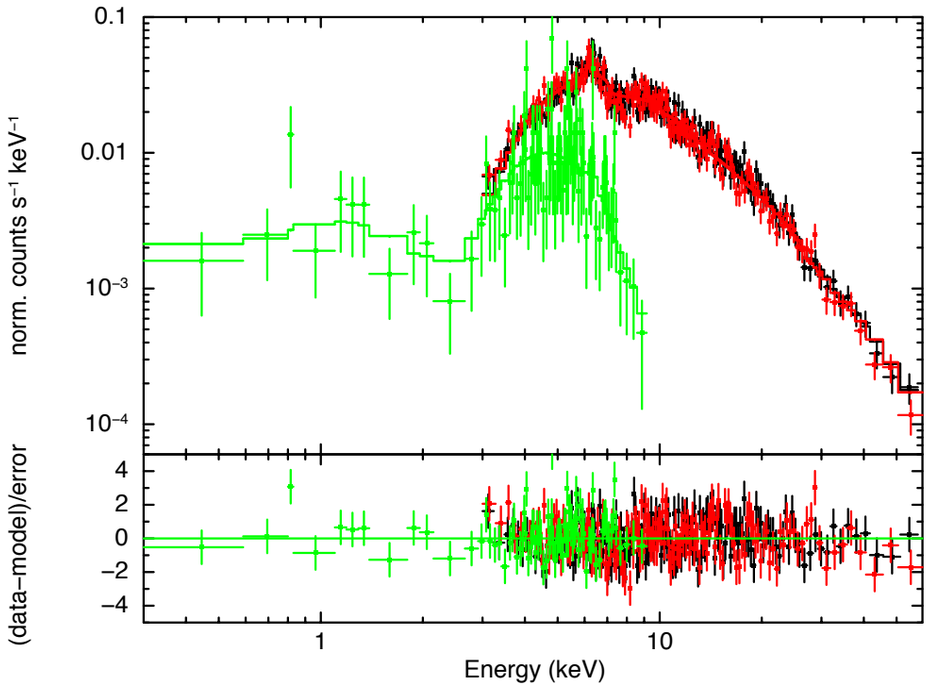
Salvestrini et al. in prep.

12MGS

Optical: *SALT* spectra



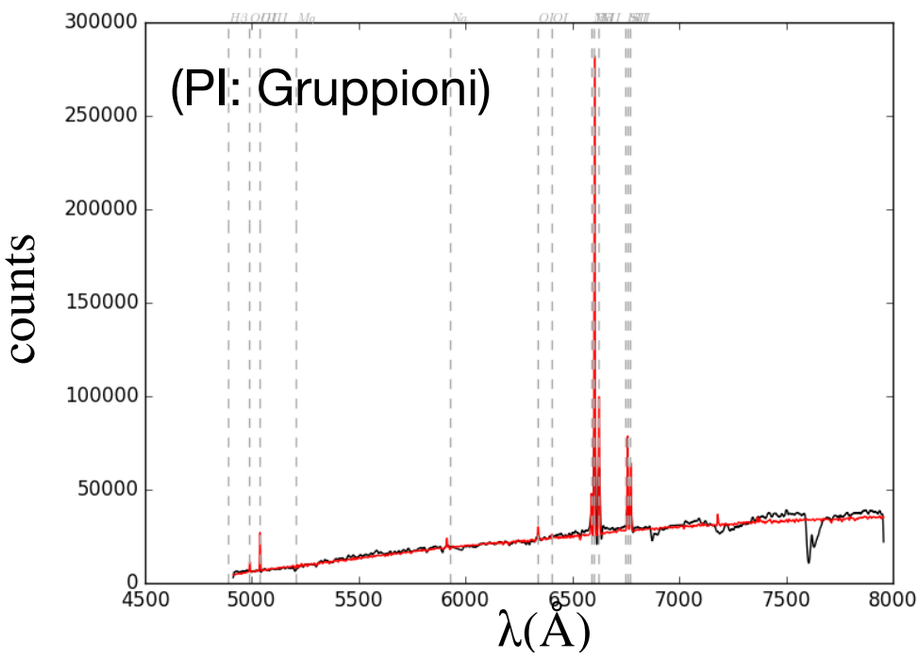
X-rays: spectra from (~0.5-35 keV)



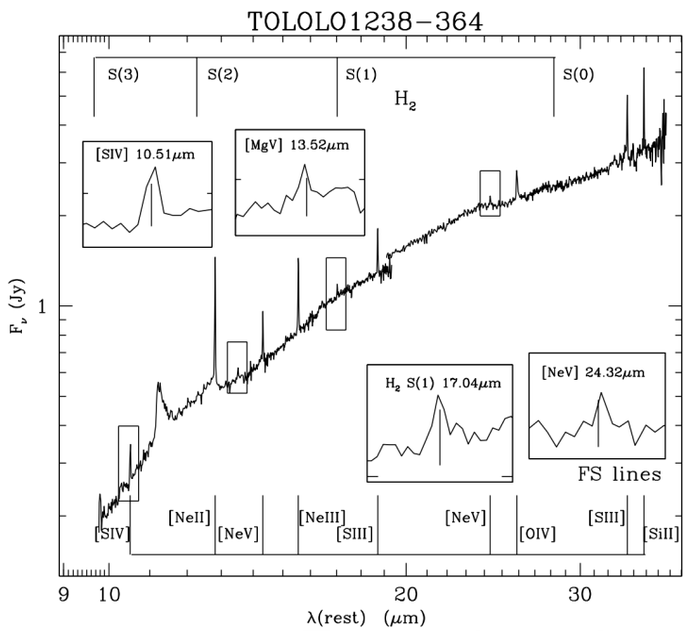
Salvestrini et al. in prep.

12MGS

Optical: *SALT* spectra

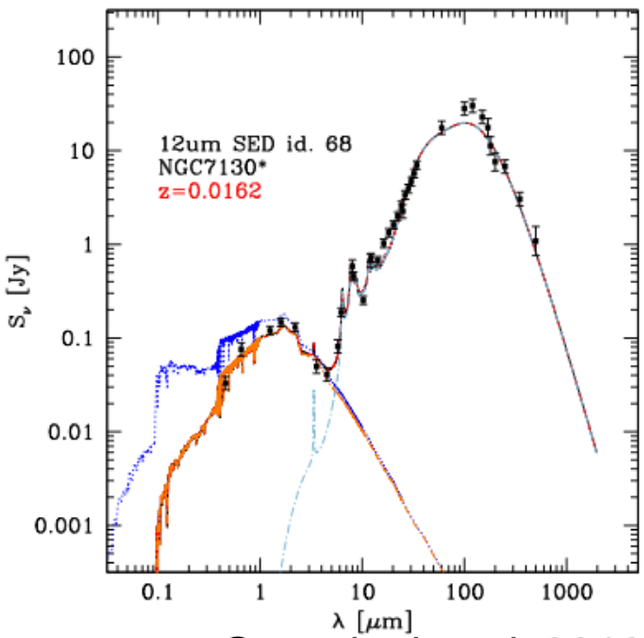


mid-IR: *Spitzer/IRS* spectra (~5.5-37 μm)



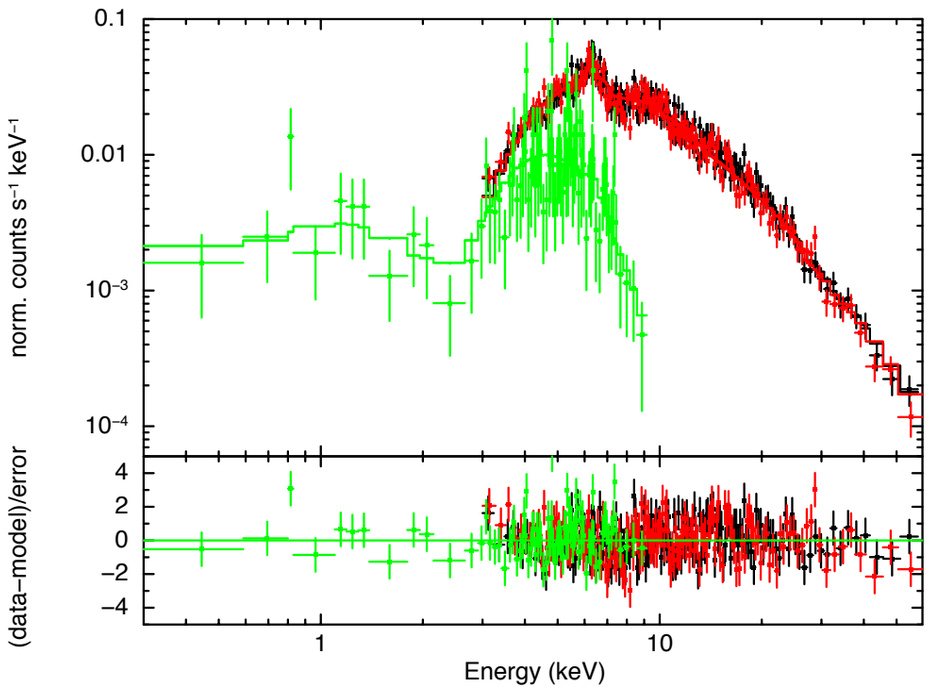
Tommasin et al. 2010

far-IR: *Herschell* photometry



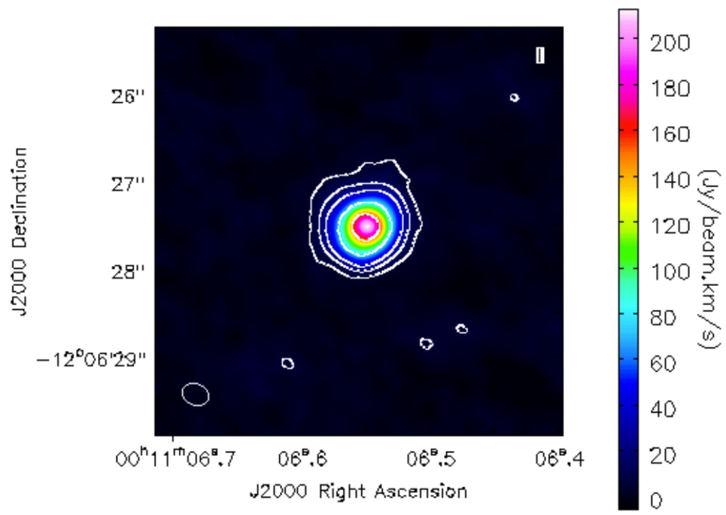
Gruppioni et al. 2016

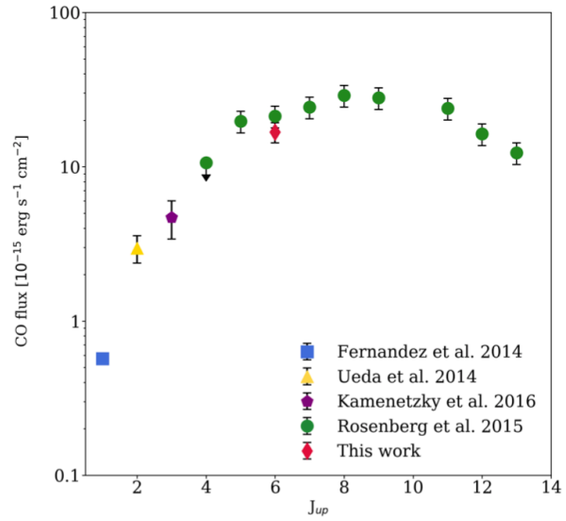
X-rays: spectra from (~0.5-35 keV)



Salvestrini et al. in prep.

mm: CO & molecular emission lines from interferometric (*ALMA*) & single dish (*APEX*) obs.

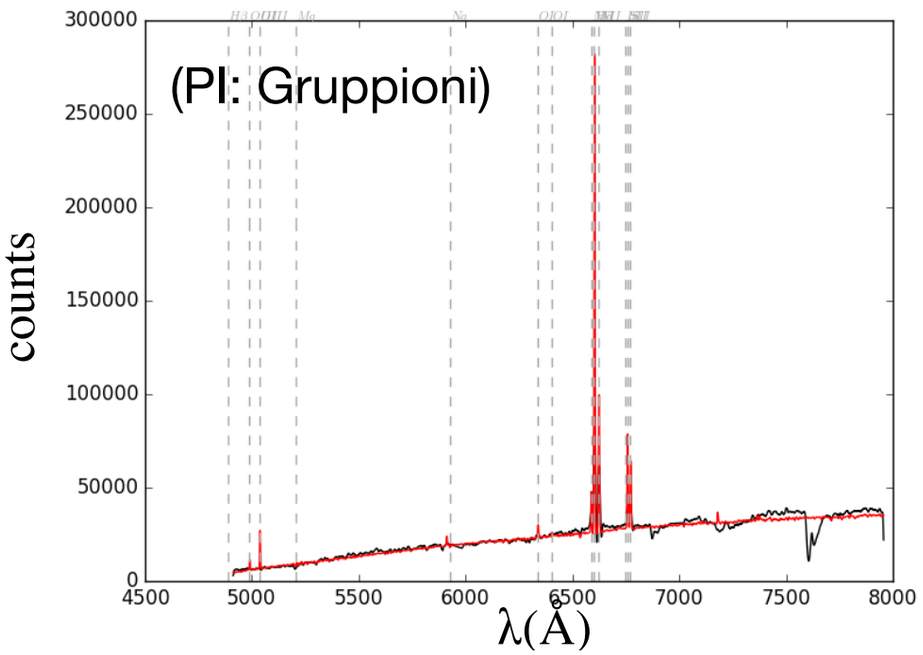




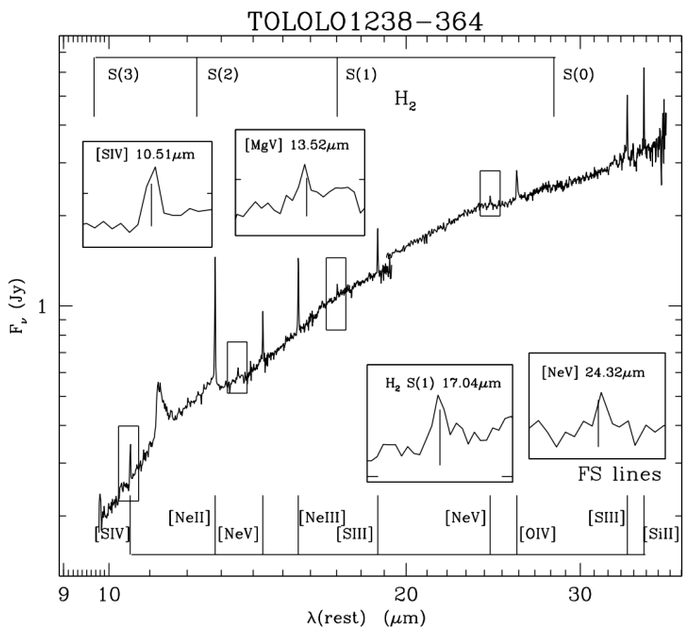
Mingozzi et al. 2017

12MGS

Optical: *SALT* spectra

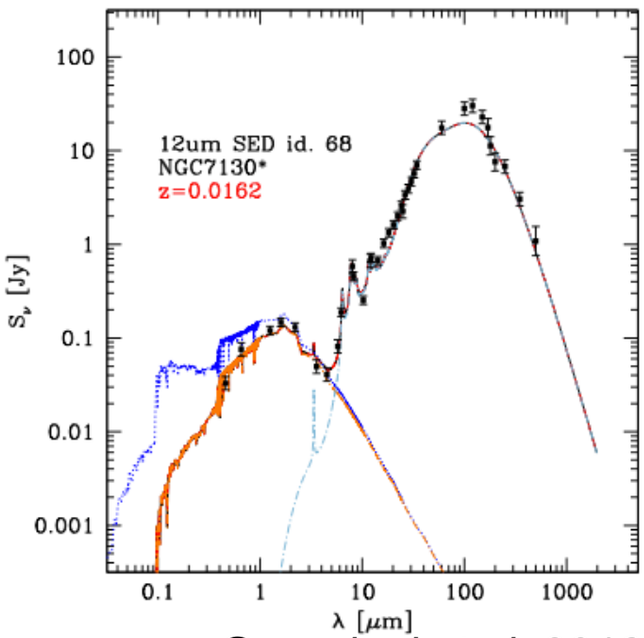


mid-IR: *Spitzer/IRS* spectra (~5.5-37 μm)



Tommasin et al. 2010

far-IR: *Herschell* photometry



Gruppioni et al. 2016

The sample

Gruppioni et al. 2016

The sample

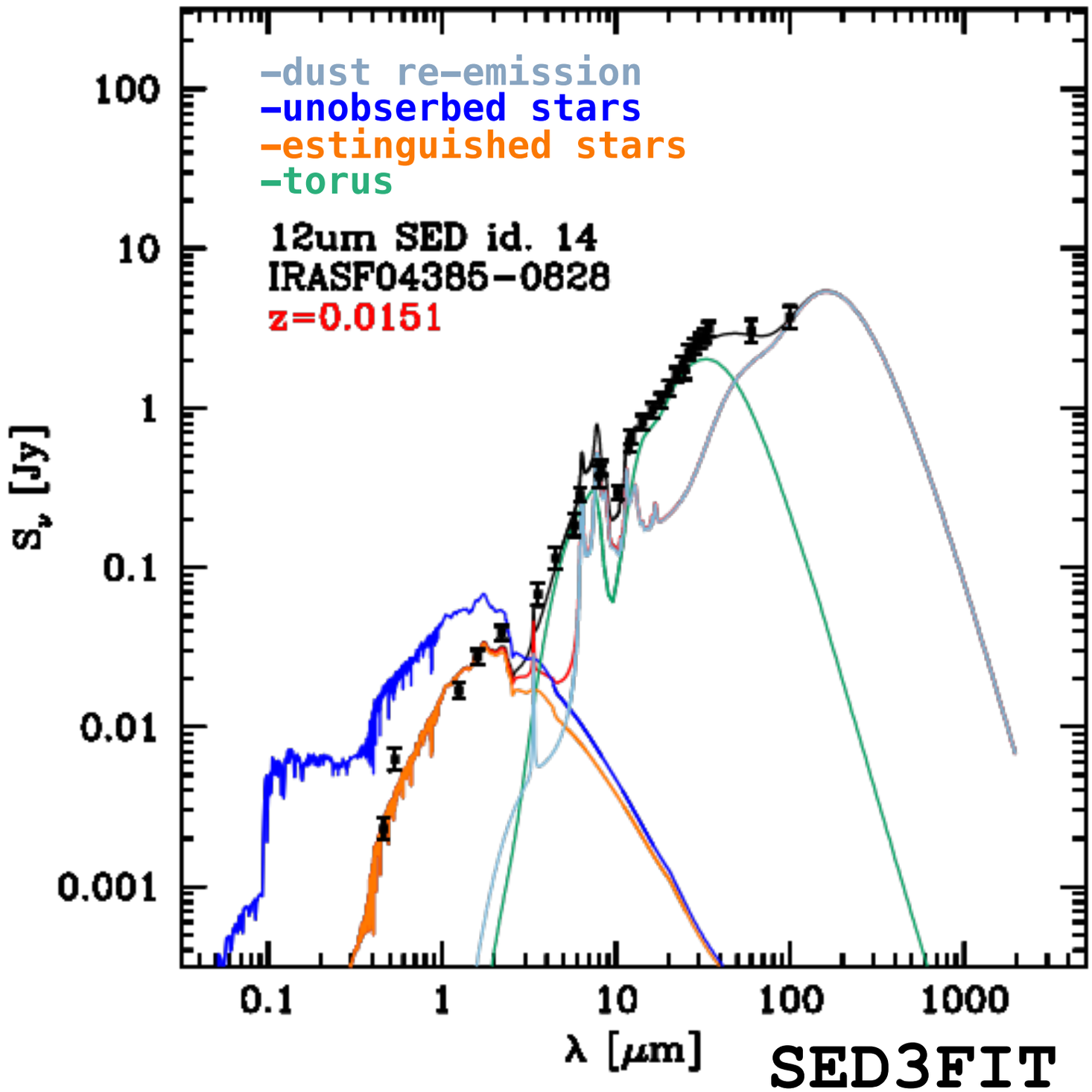
Gruppioni et al. 2016

76 galaxies having
Spitzer/IRS mid-IR spectra

$0.0023 < \boldsymbol{z} < 0.1849$

The sample

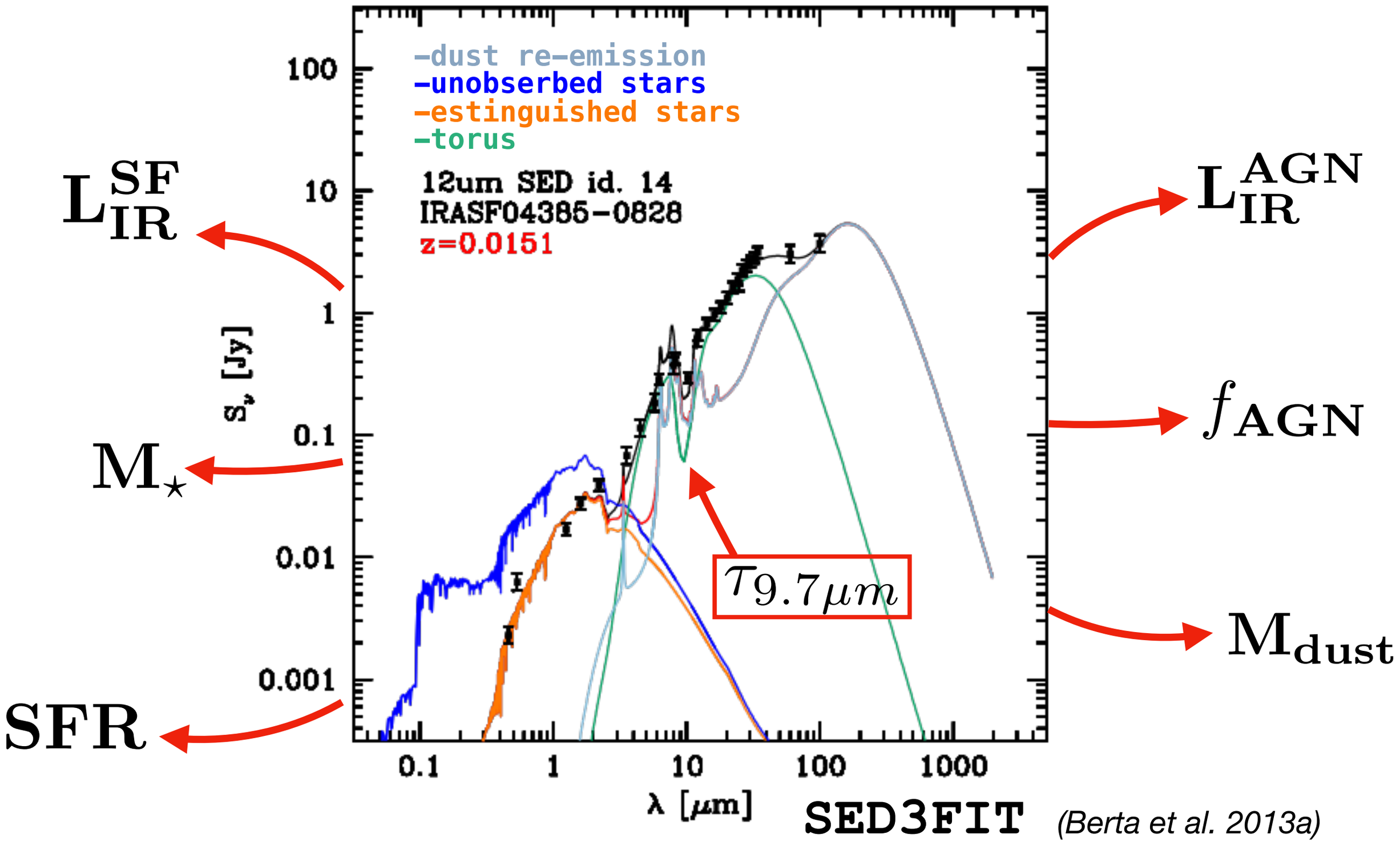
Gruppioni et al. 2016



SED3FIT *(Berta et al. 2013a)*

The sample

Gruppioni et al. 2016



The sample

Gruppioni et al. 2016

76 galaxies having
Spitzer/IRS mid-IR spectra

$0.0023 < \boldsymbol{z} < 0.1849$

Seyfert 1 (35/76)

+

Seyfert 2 (37/76)

+

LINER (3/76)

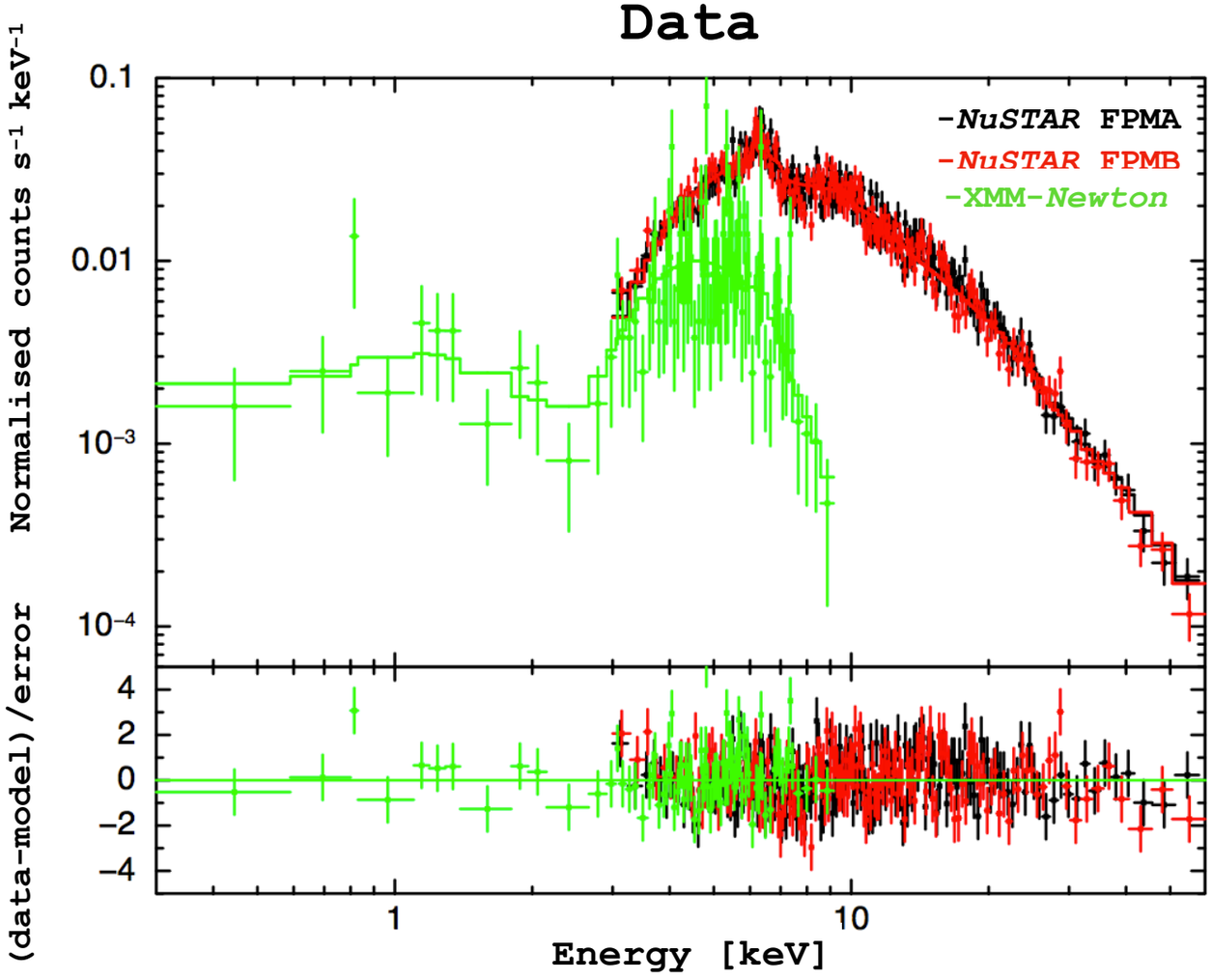
+

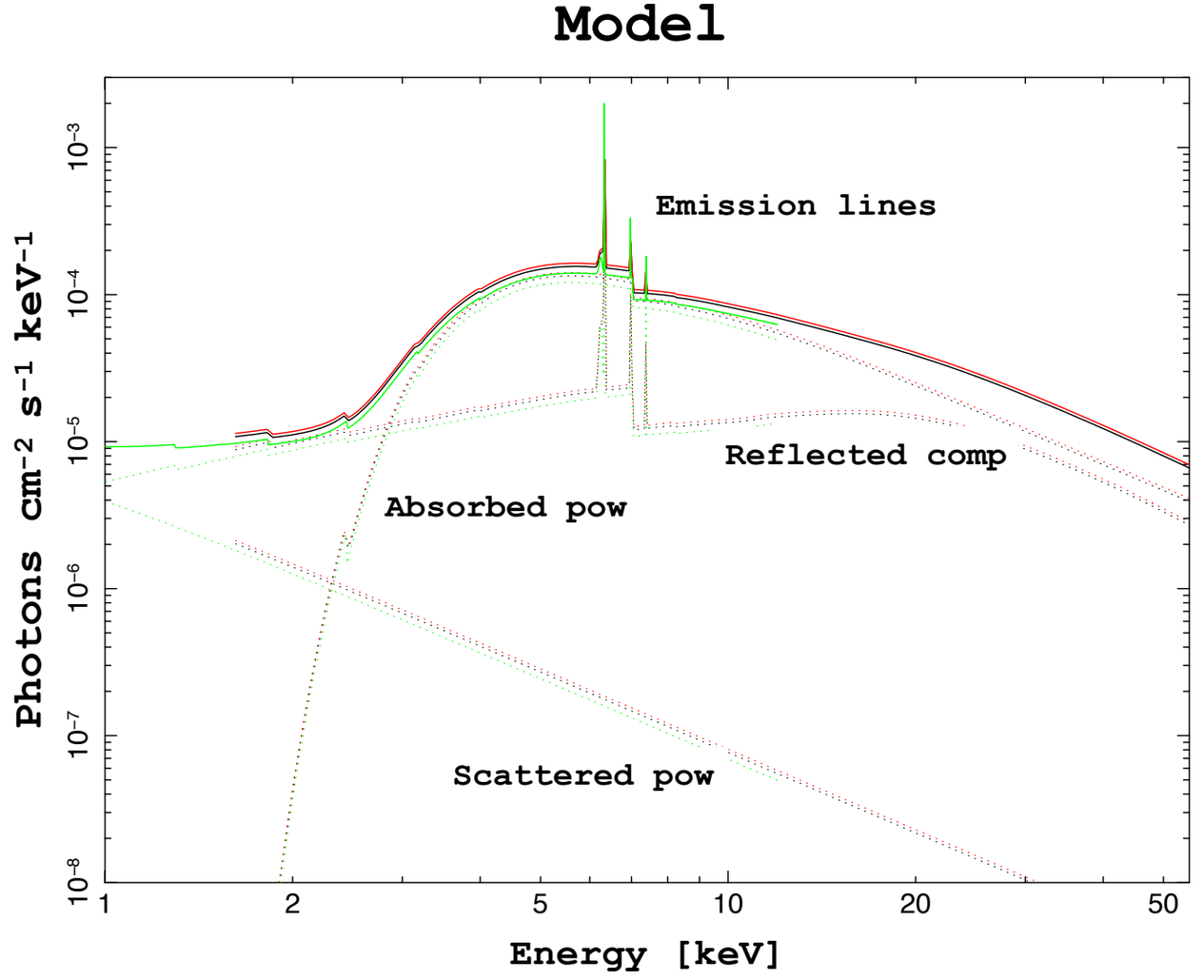
Starburst (1/76)

4/37: only *Chandra* and/or XMM-*Newton*

26/37: *NuSTAR* + <10keV

X-ray spectral analysis

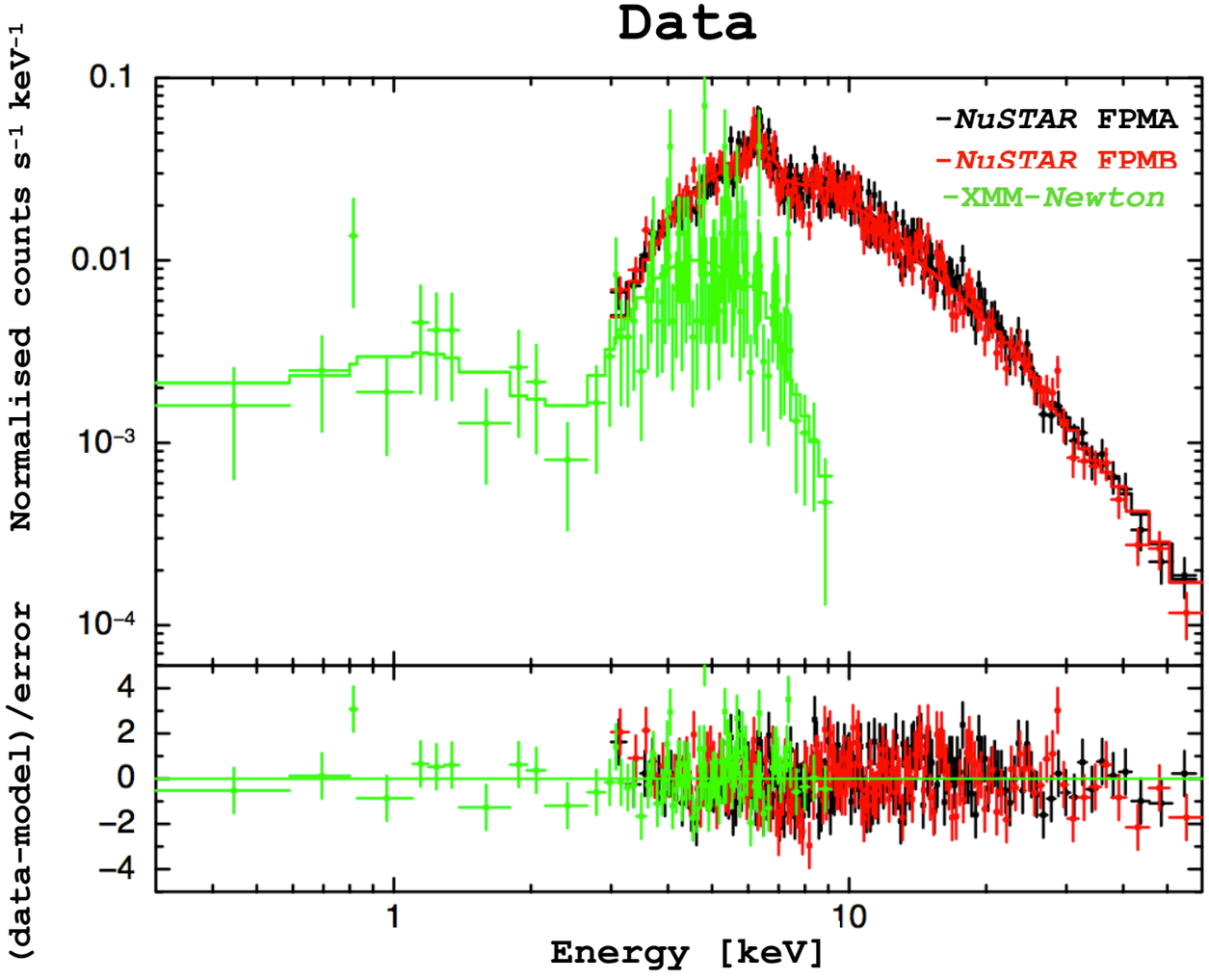


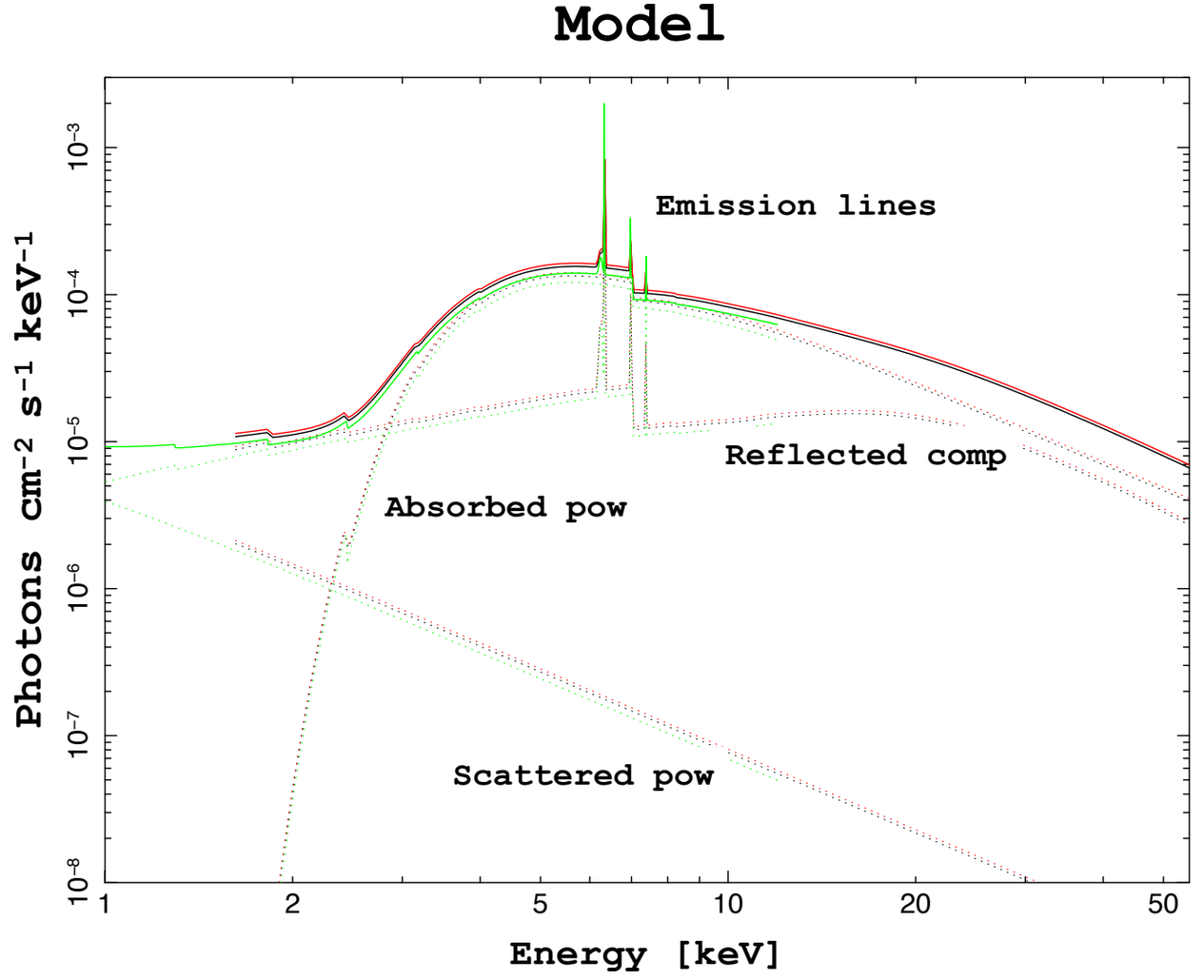


Phenomenological models

GalacticAbs(Abs.–pow. + scatter/mekal + reflection + lines)

X-ray spectral analysis





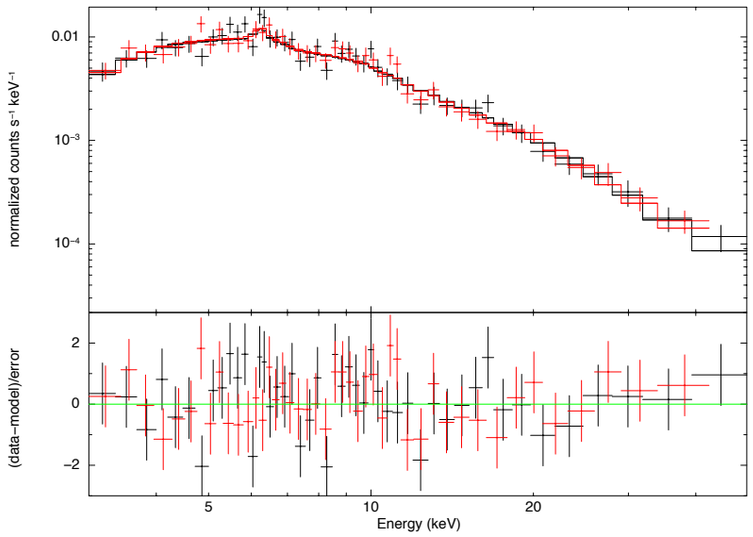
Phenomenological models: ***GalacticAbs(Abs.–pow. + scatter/mekal + reflection + lines)***

Physical models: MYTorus (*Murphy&Yaqoob 2009*)
borus02 (*Baloković et al. 2018*)

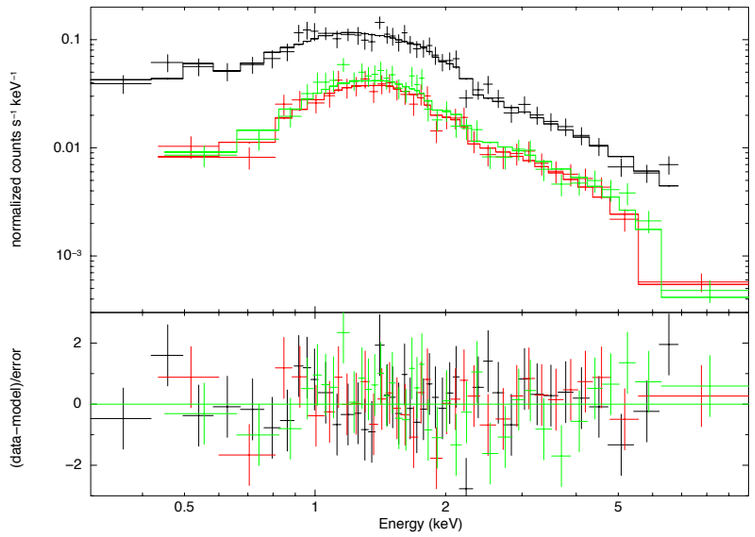
Gandhi et al. 2017; Kammoun et al. 2019; Lanzuisi et al. 2018; Marchesi et al. 2018; Ursini et al. 2015; Walton et al. 2018; …

Poster #468 Zhao

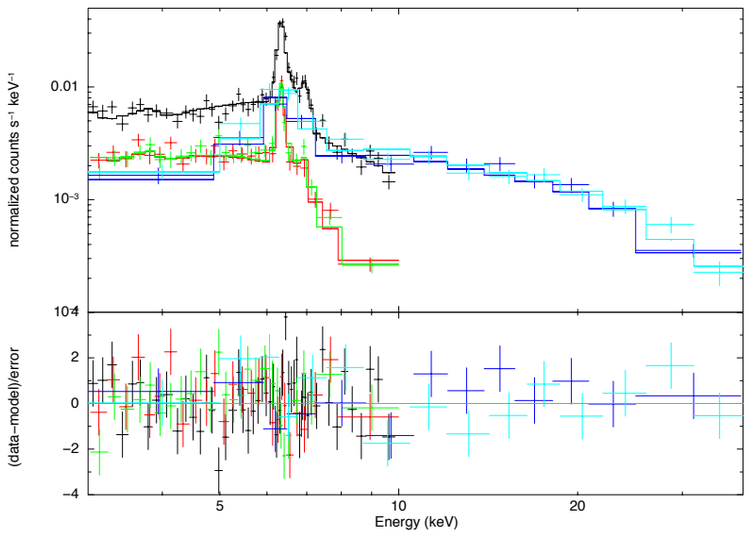
ngc0513



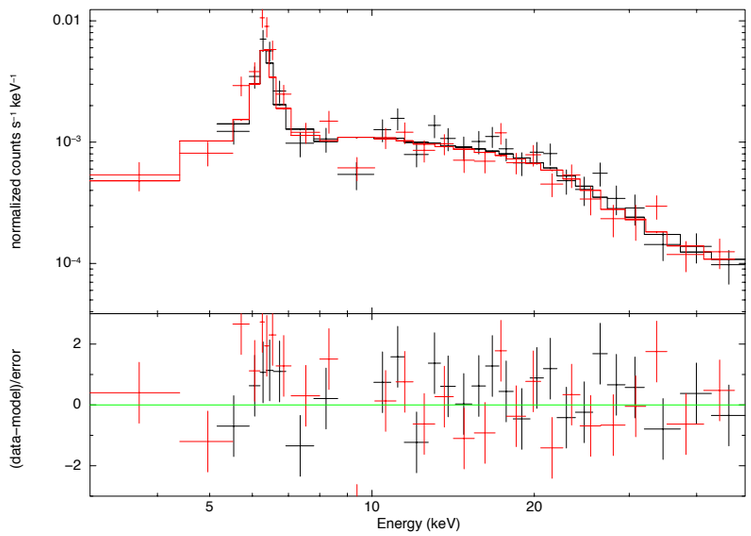
irasf01475



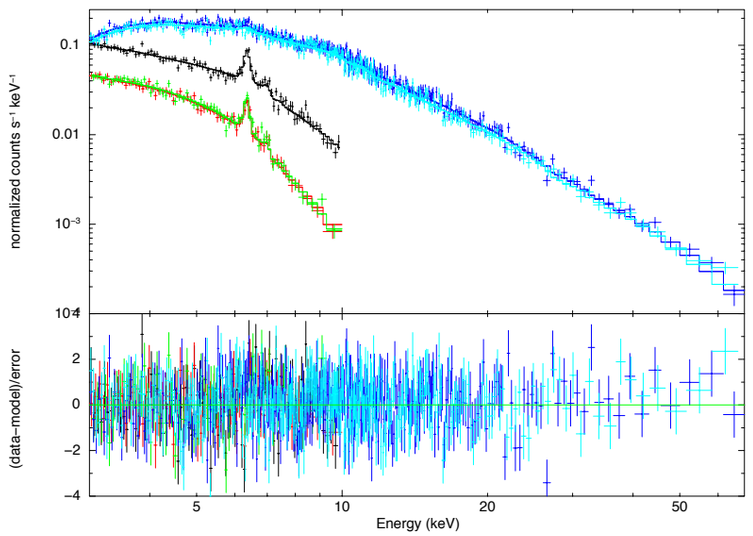
ngc0424



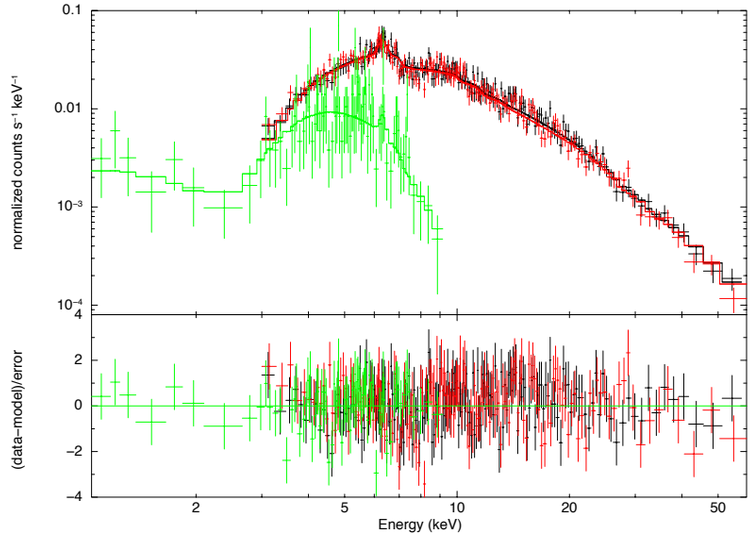
ngc1320



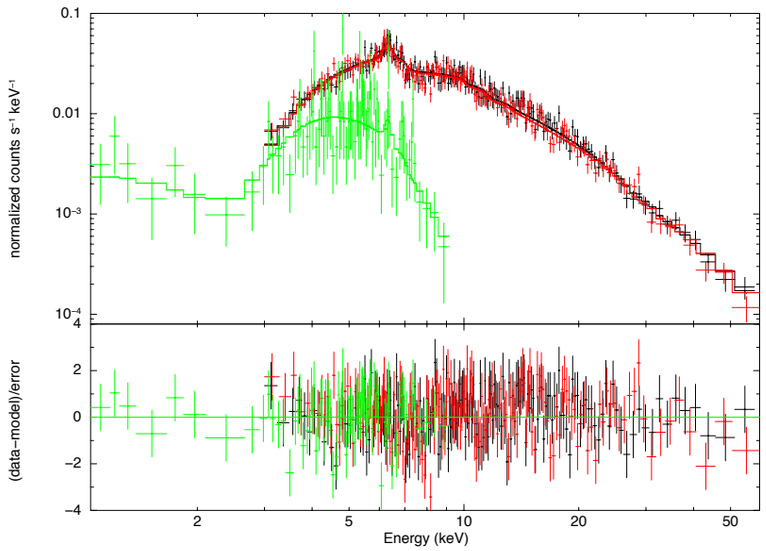
ngc2992



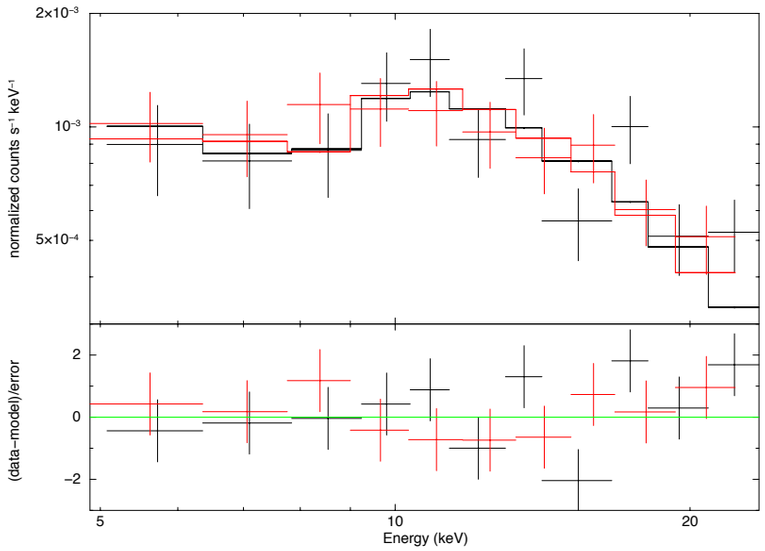
ic5063



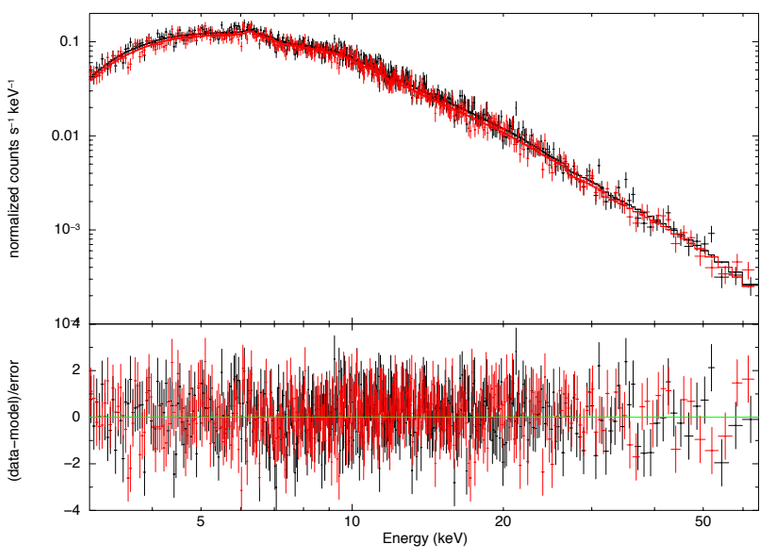
ic5063

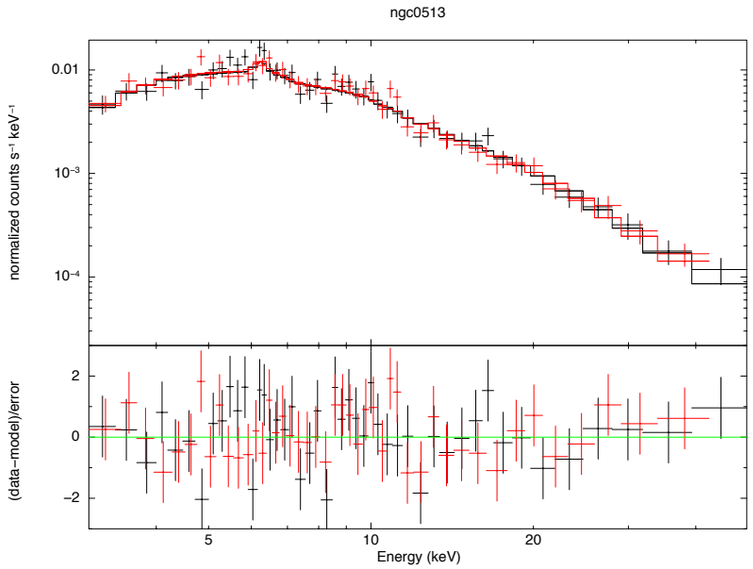


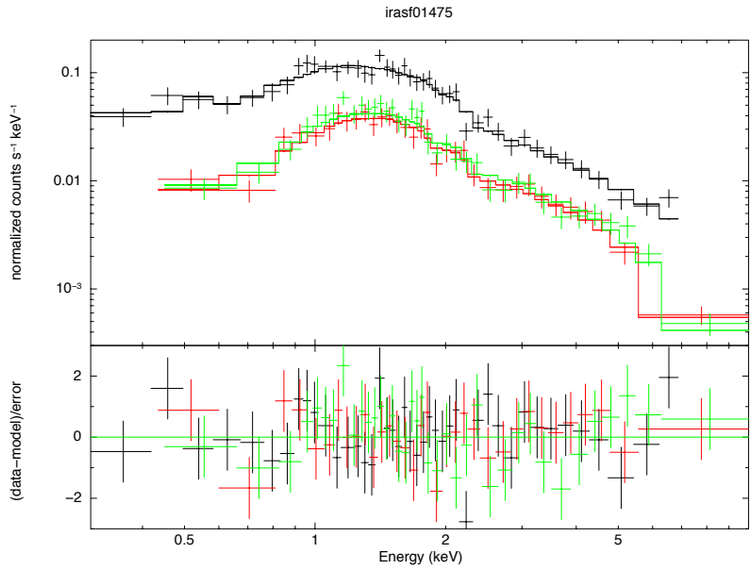
ugc05101

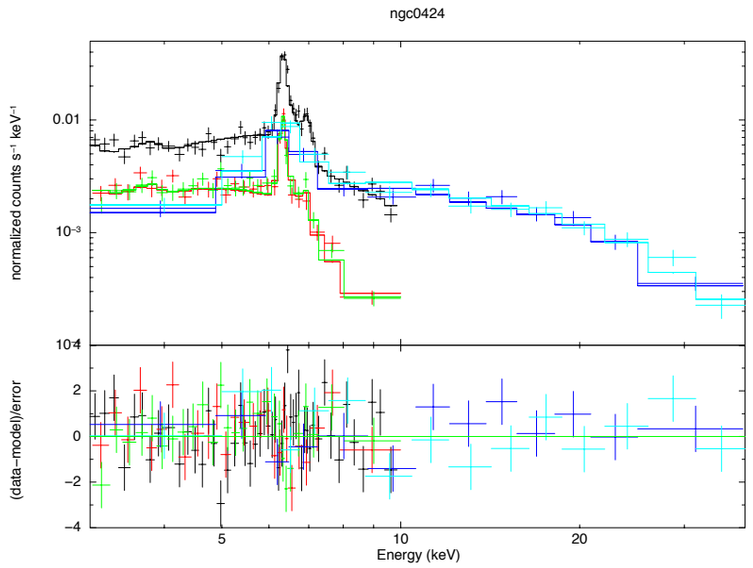


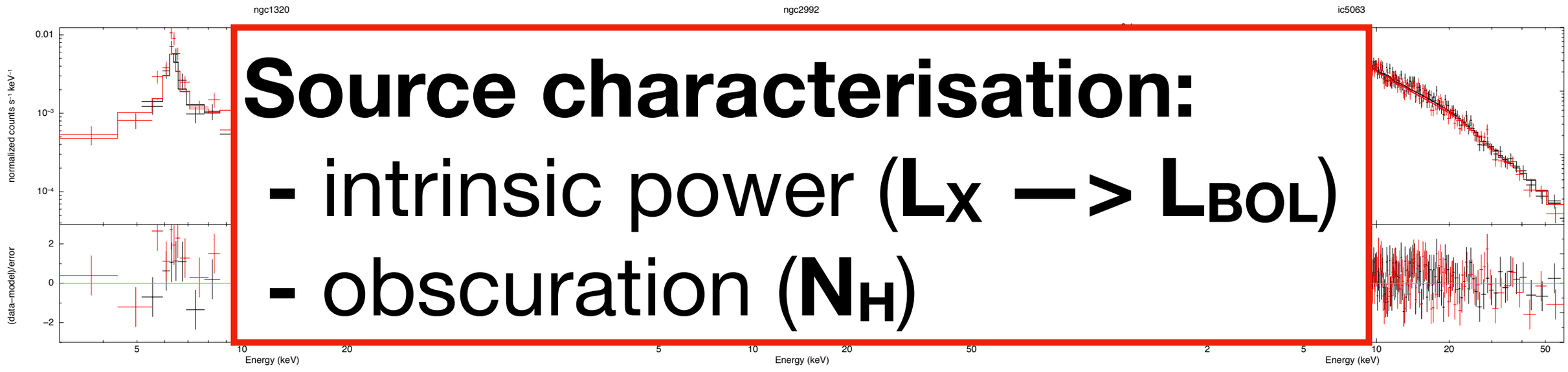
ngc0262





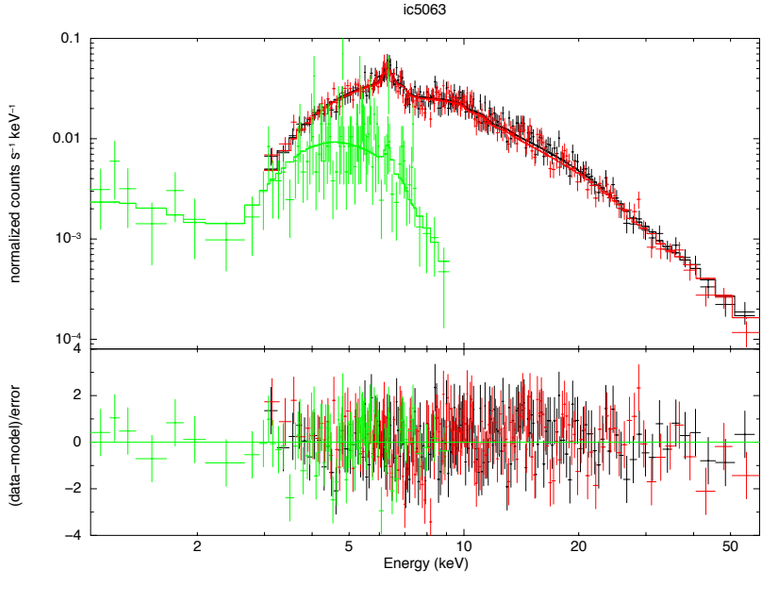


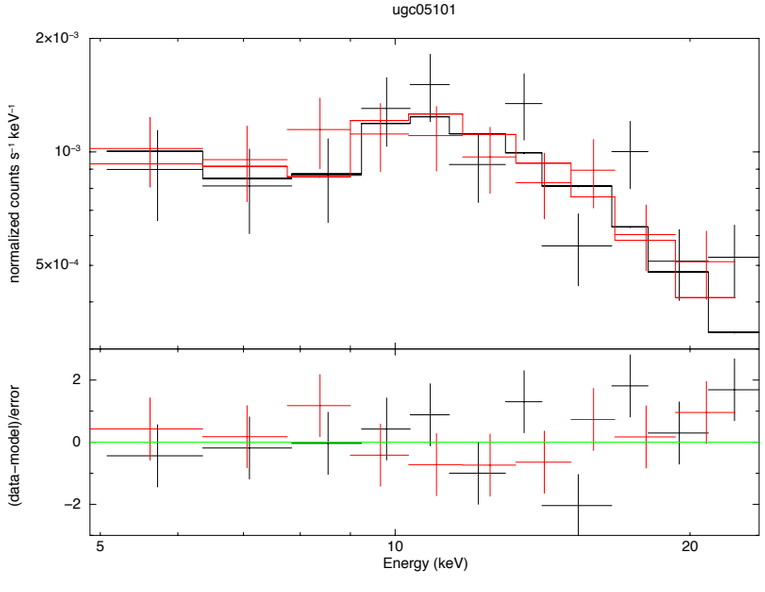


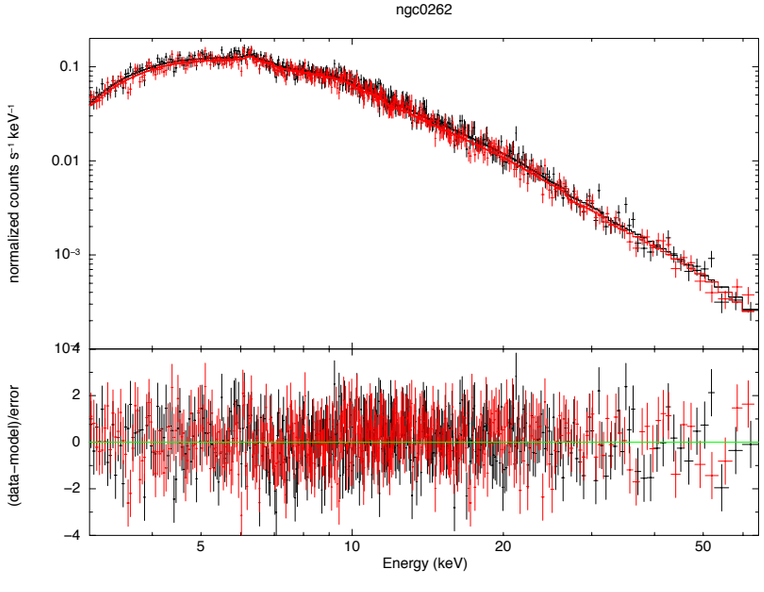


Source characterisation:

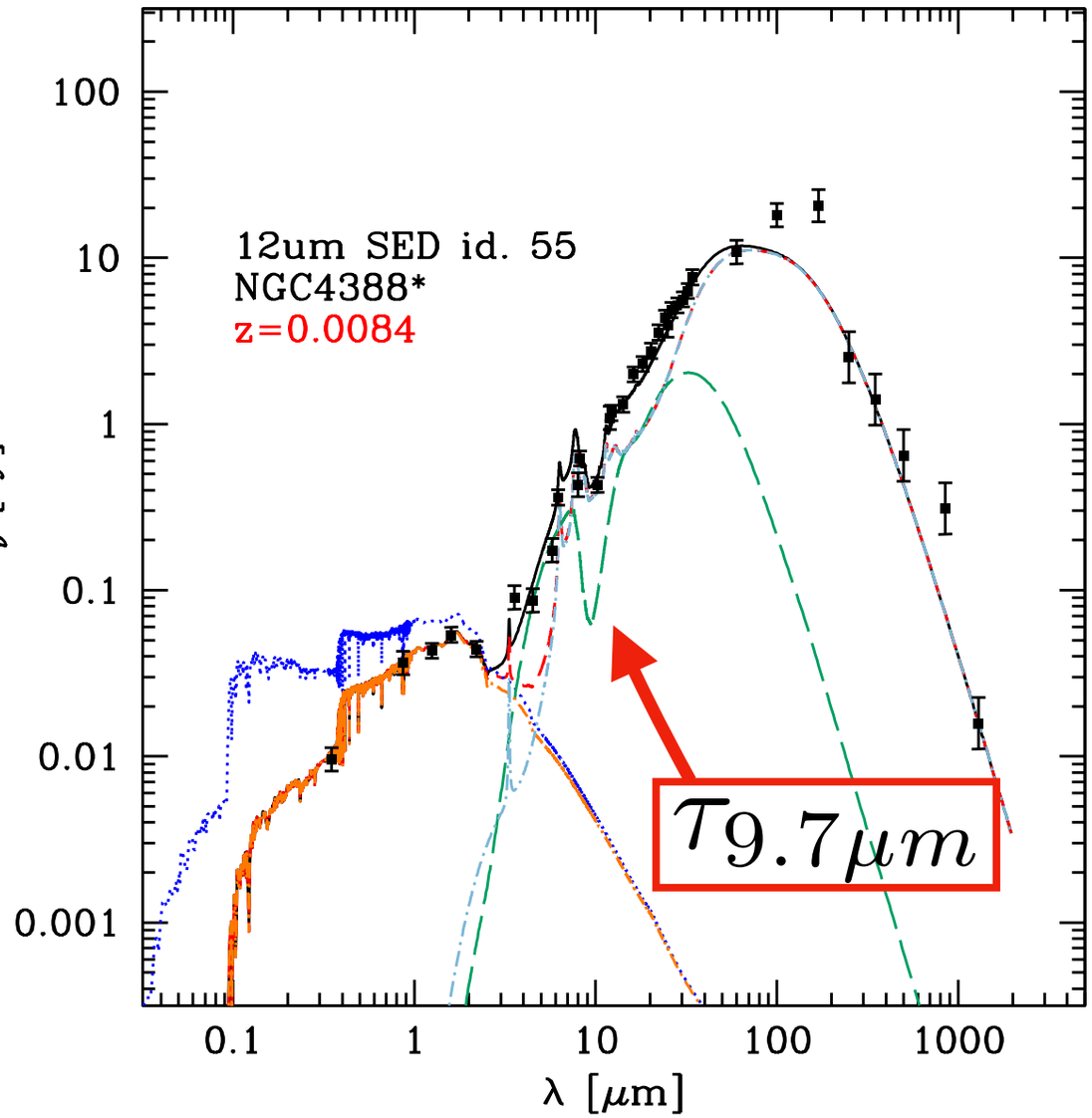
- intrinsic power (L_X —> L_{BOL})
- obscuration (N_H)

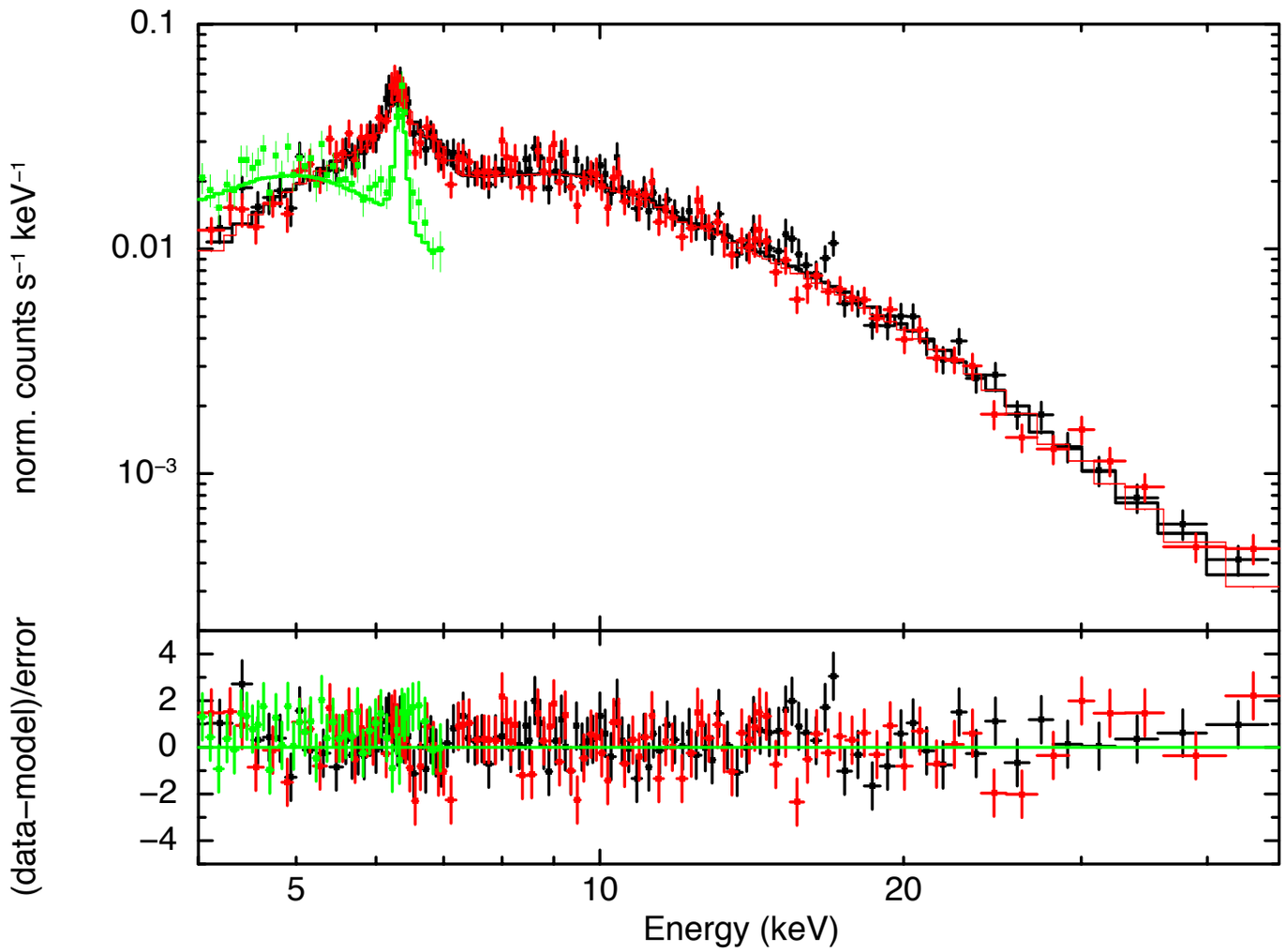






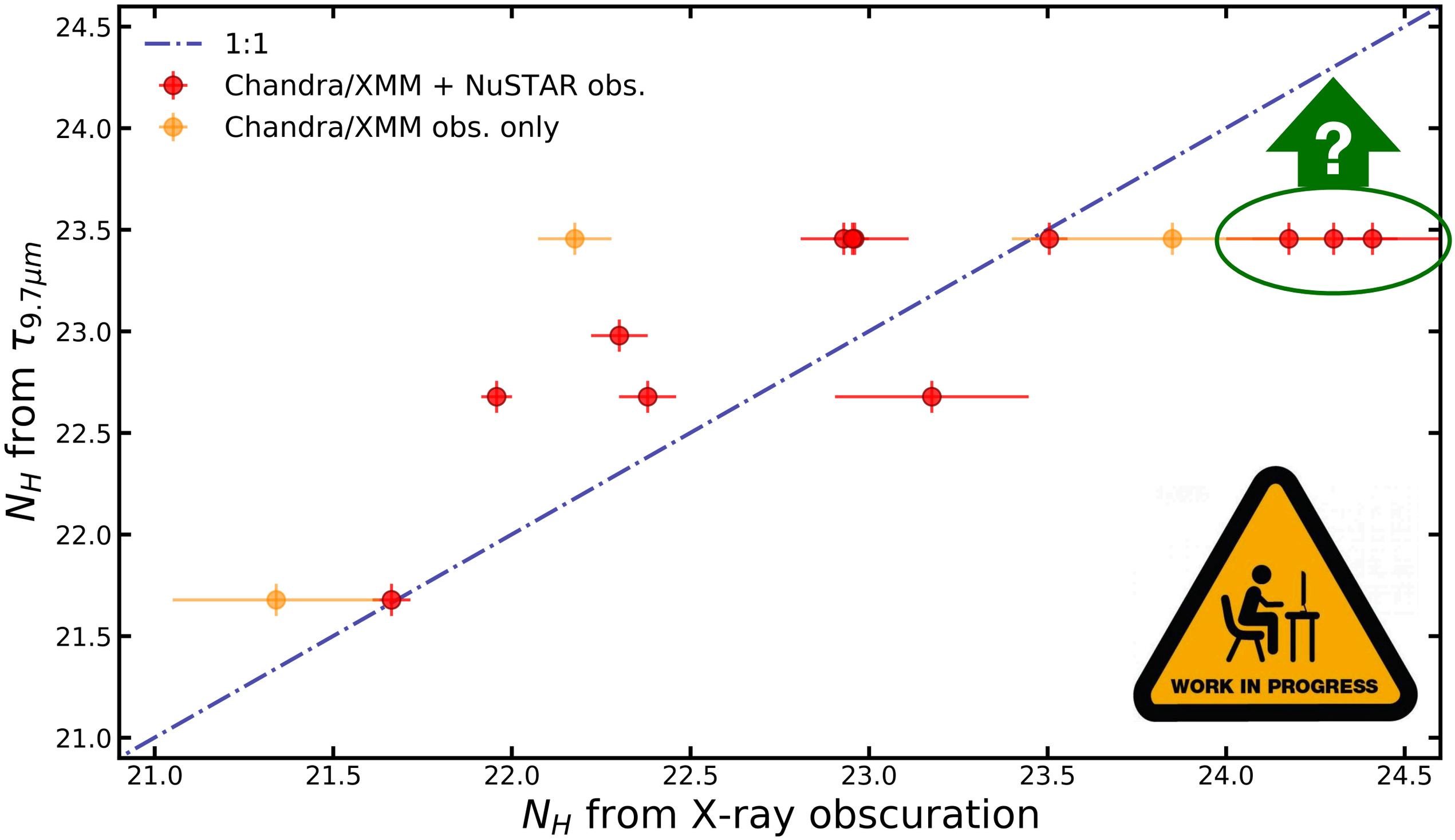
X-rays + IR: obscuration





$N_H(\tau_{9.7\mu m})$ **vs.** $N_H(X\text{-}rays)$

X-rays + IR: obscuration

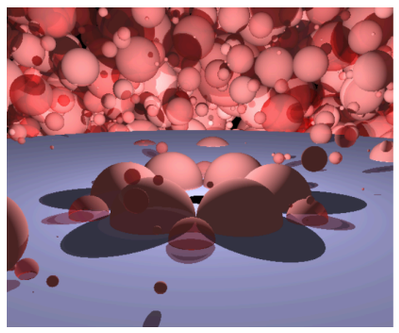


Salvestrini et al. in prep.

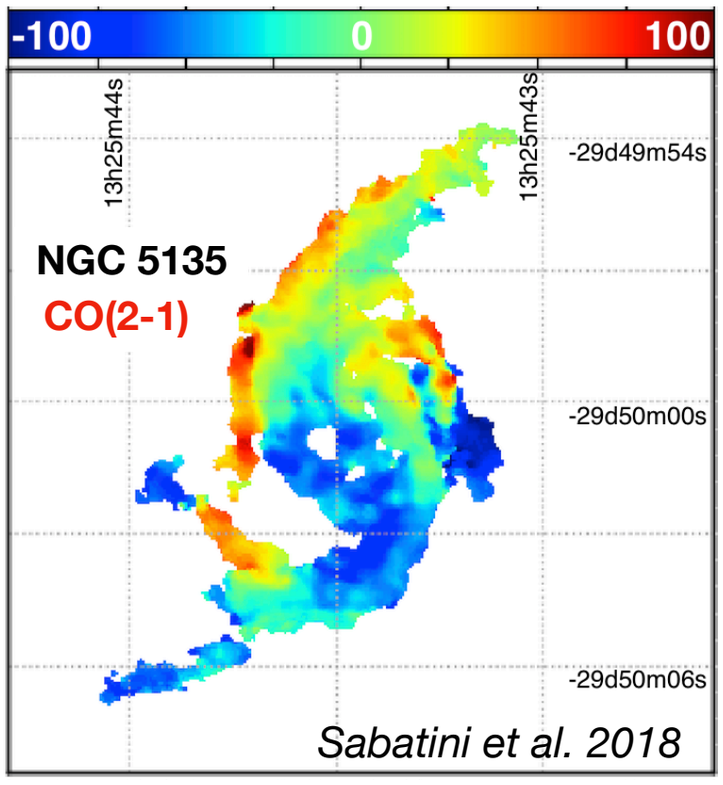
Future perspective

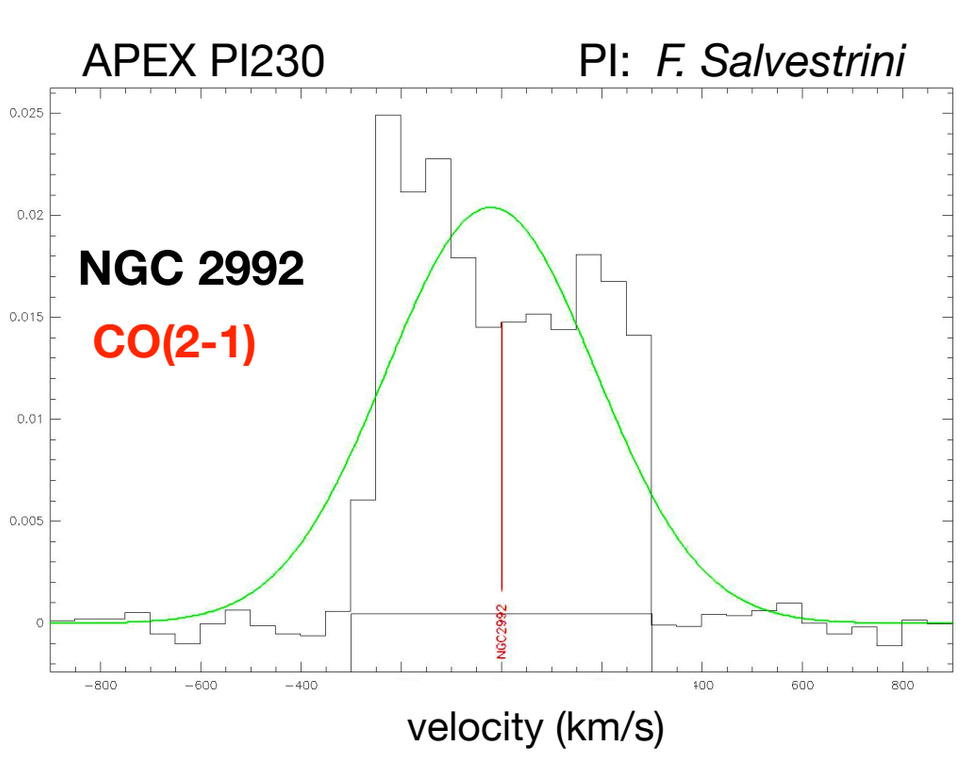
- X-ray spectral **physical model** & **clumpy torus**

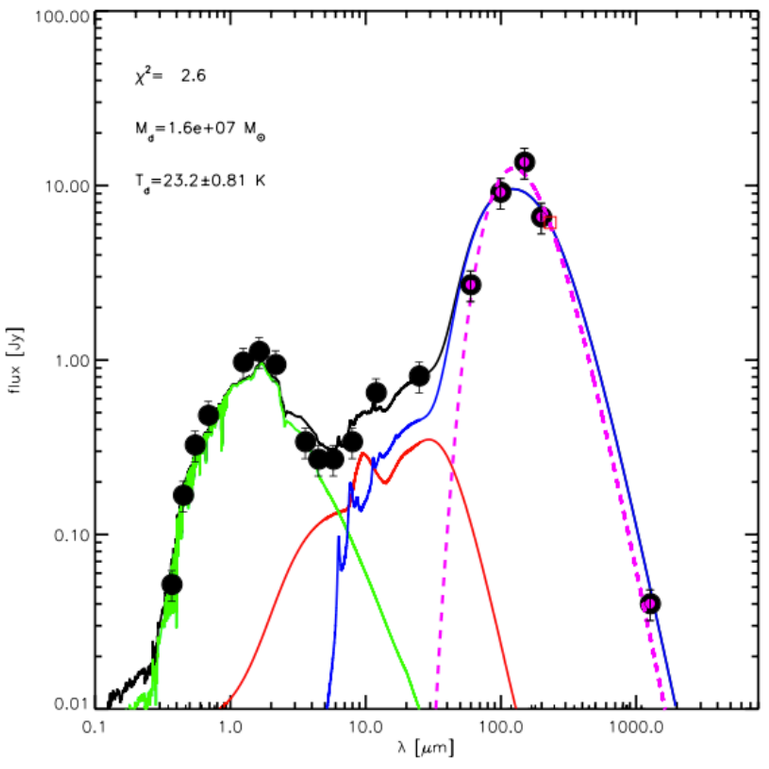
Poster #101 Buchner

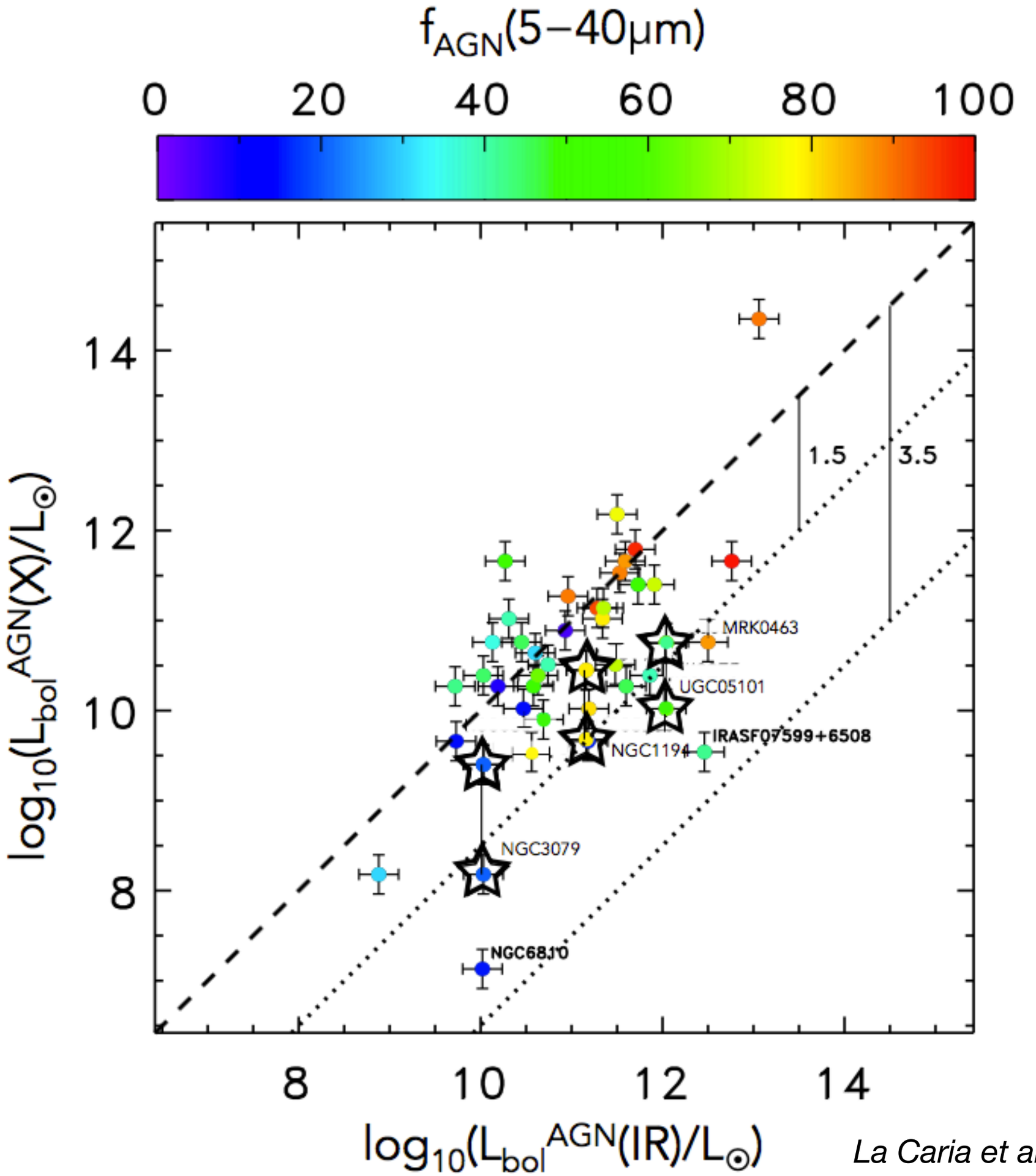


- Molecular gas (M_{H2}) and dust mass (M_{dust})









La Caria et al. 2019