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<b>Volume</b>	13

# Orientation effects on quasars SED

## The torus IR emission

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UniFi - INAF-OA Arcetri - CfA

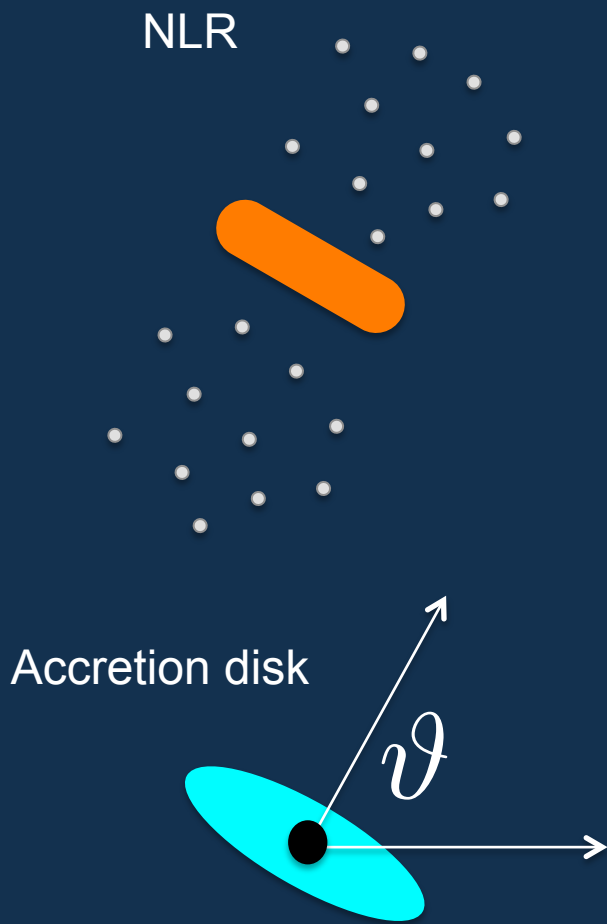
*In collaboration with:*

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Guido Risaliti  
Elisabeta Lusso



# The longstanding problem

# The longstanding problem



*Risaliti, Salvati, Marconi 2011*

$L_{[OIII]}$  ISOTROPIC

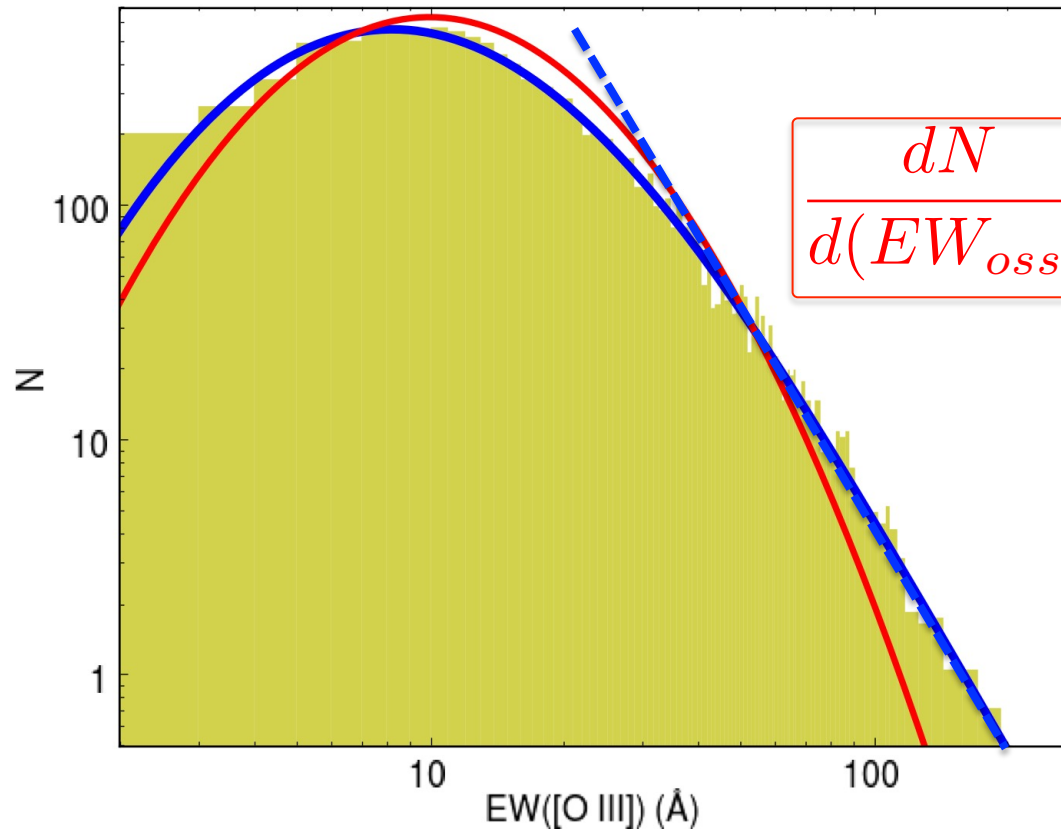
$$L_{DISK_{obs}} = L_{DISK_{int}} \cos \vartheta$$

$$EW_{[OIII]} \propto f(\vartheta)$$

# EW[OIII] as an orientation indicator

~ 12000 blue objects  
SDSS DR7

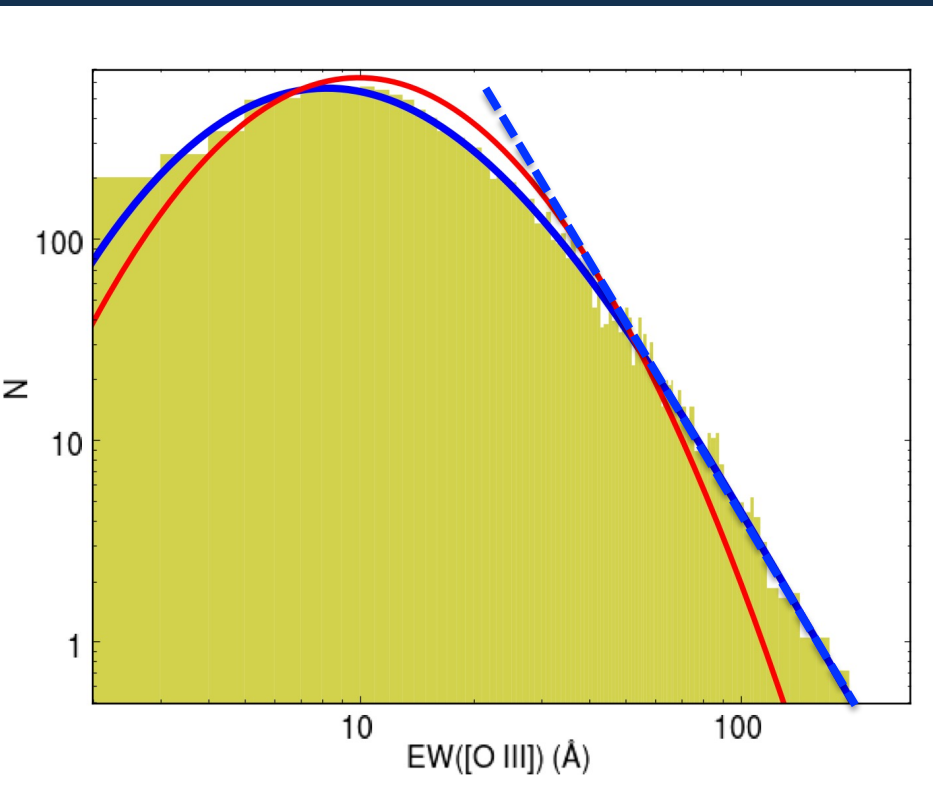
FLUX-LIMITED  
sample



Bisogni, Marconi, Risaliti 2017

# EW[OIII] as an orientation indicator

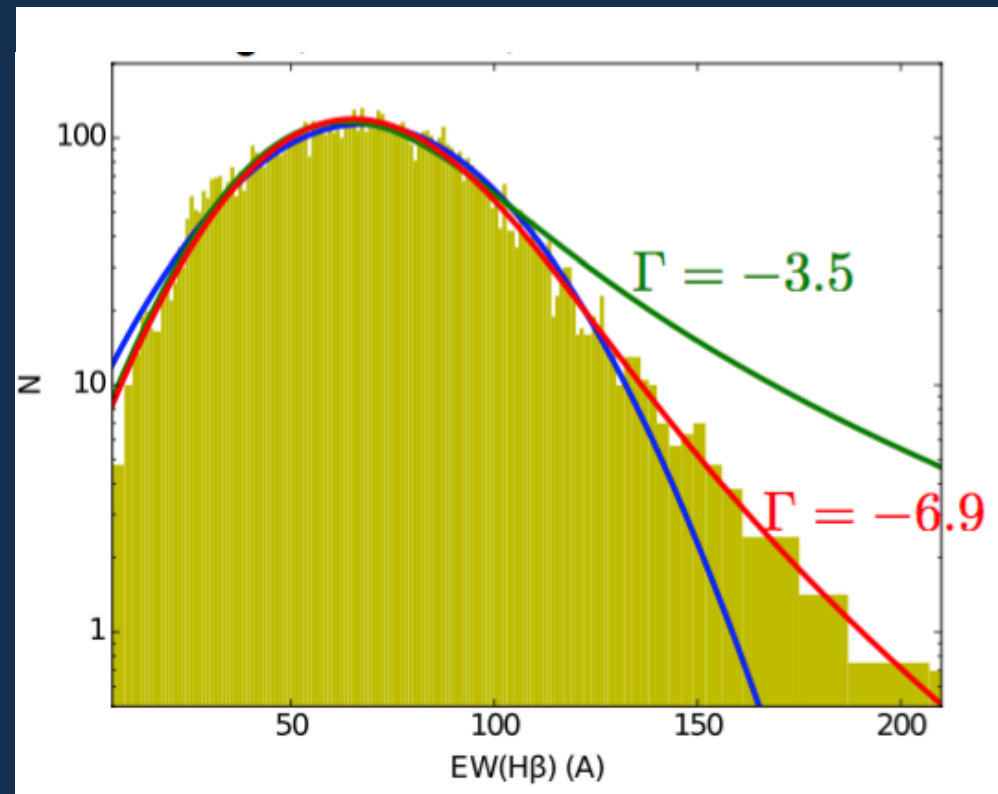
Bisogni, Marconi, Risaliti 2017



- Low EW[OIII]  
→ Mostly *face-on* sources
- High EW[OIII]  
→ *Edge-on* sources

# EW[OIII] vs Broad Lines EW

Bisogni, Marconi, Risaliti 2017

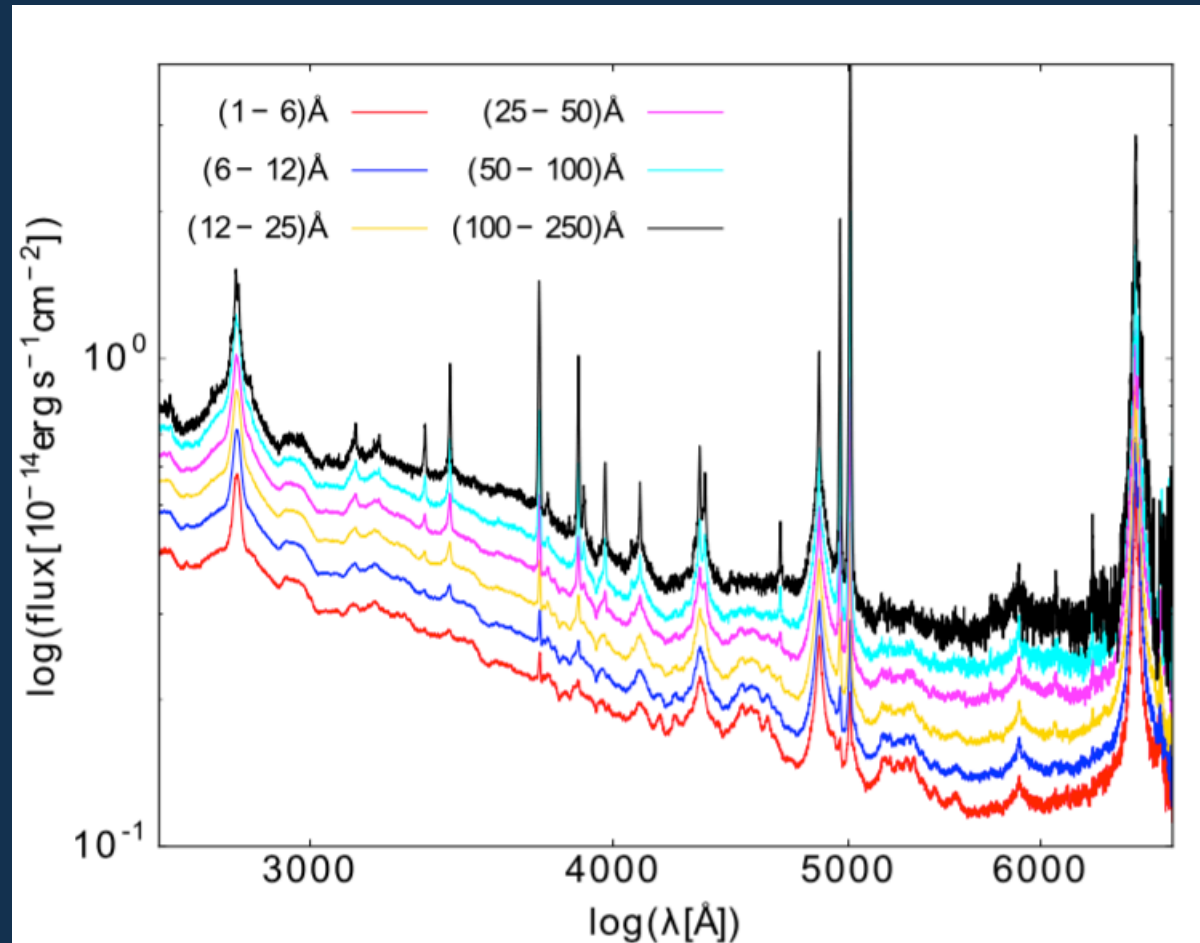
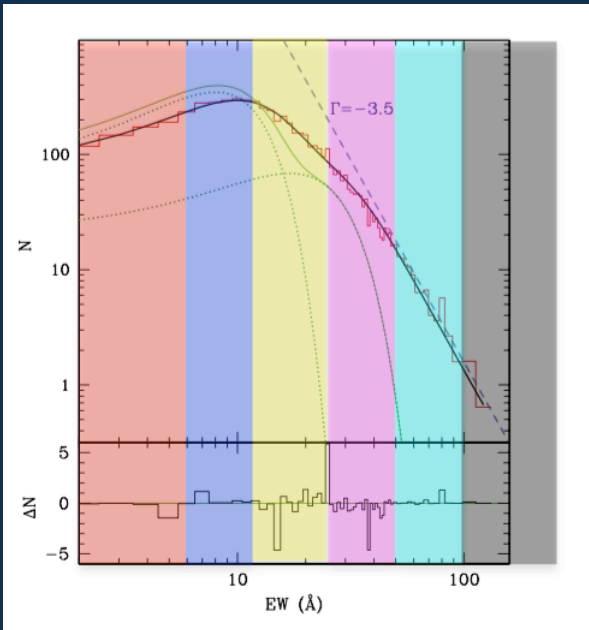


- Low EW[OIII]  
→ Mostly *face-on* sources
- High EW[OIII]  
→ *Edge-on* sources
- BLR → disk-shaped

# EW[OIII] and optical spectral features

Bisogni, Marconi, Risaliti 2017

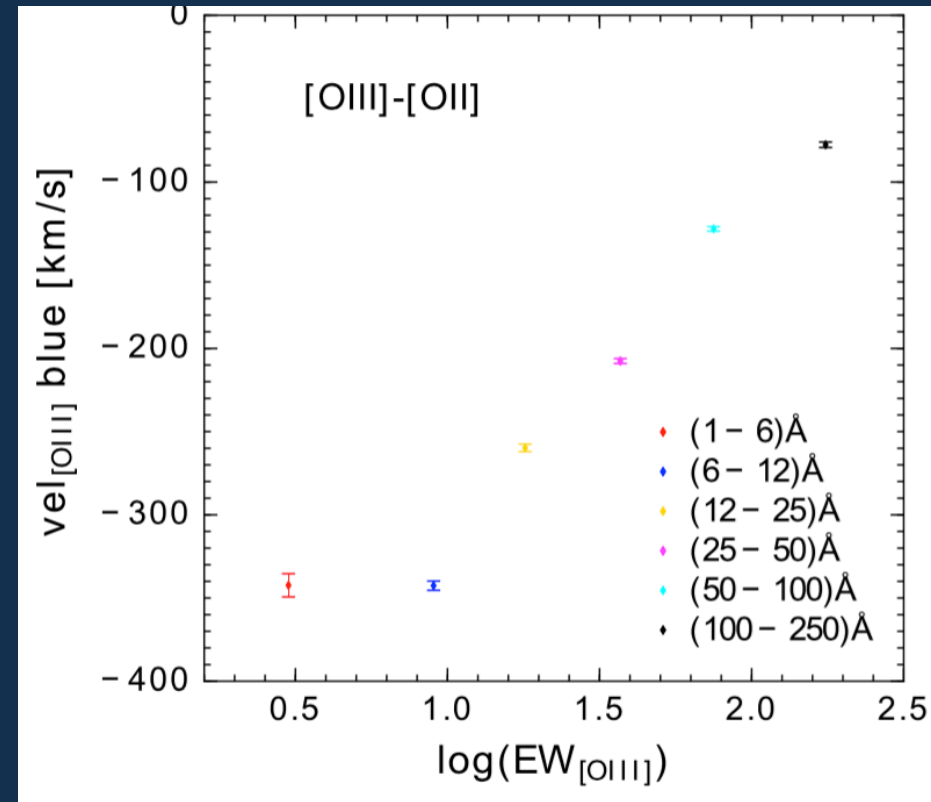
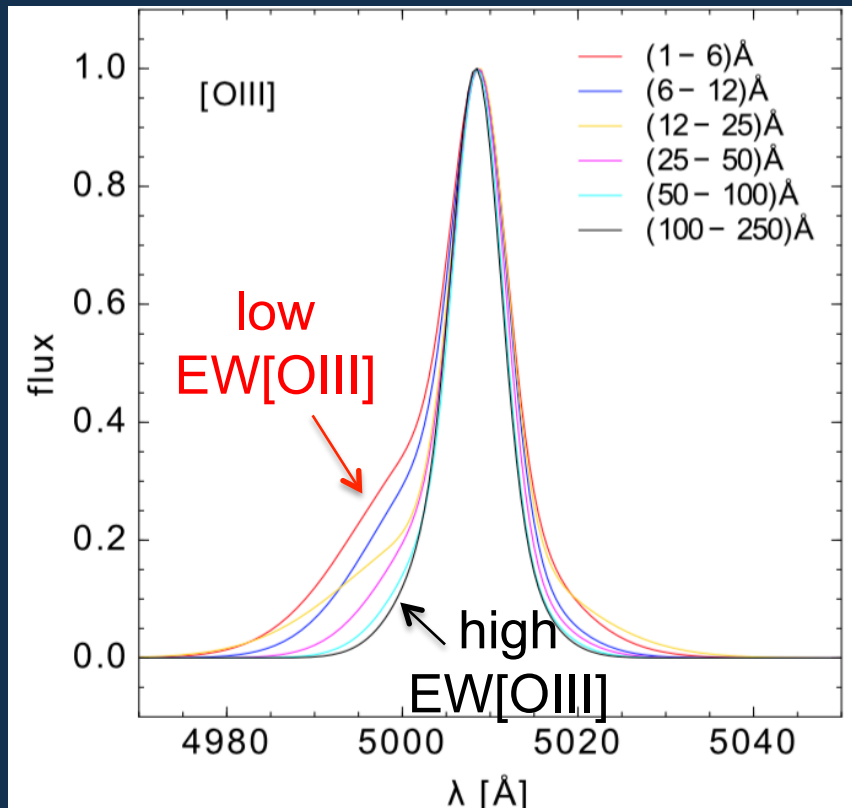
>12000 blue objects  
from SDSS DR7



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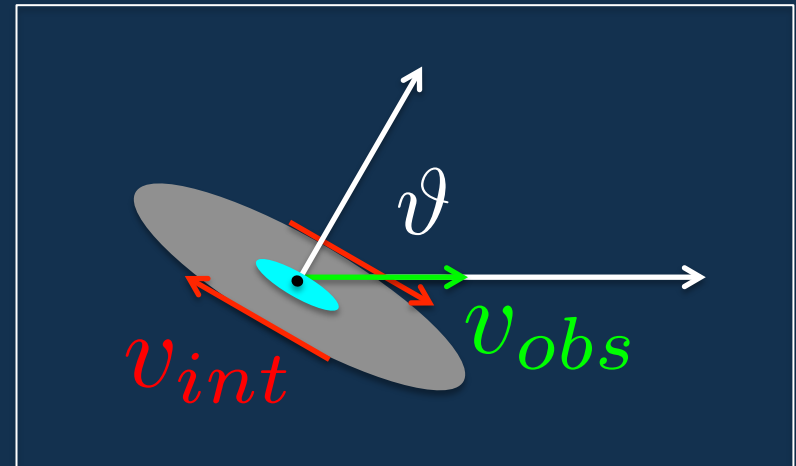
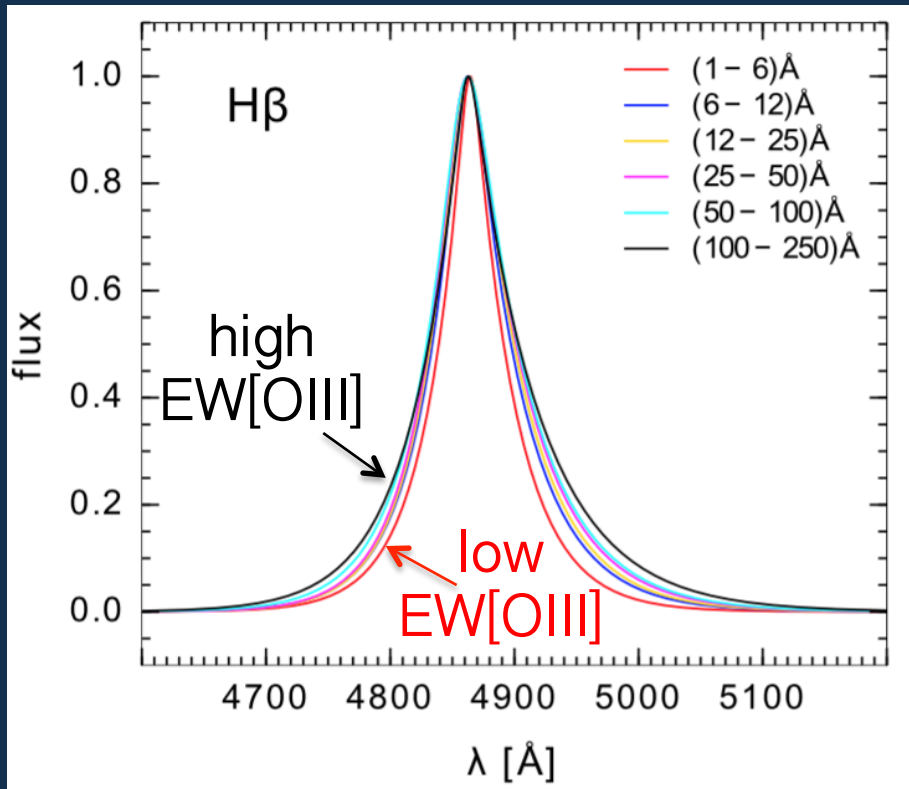
# EW[OIII] and narrow lines

Bisogni, Marconi, Risaliti 2017



# EW[OIII] and broad lines

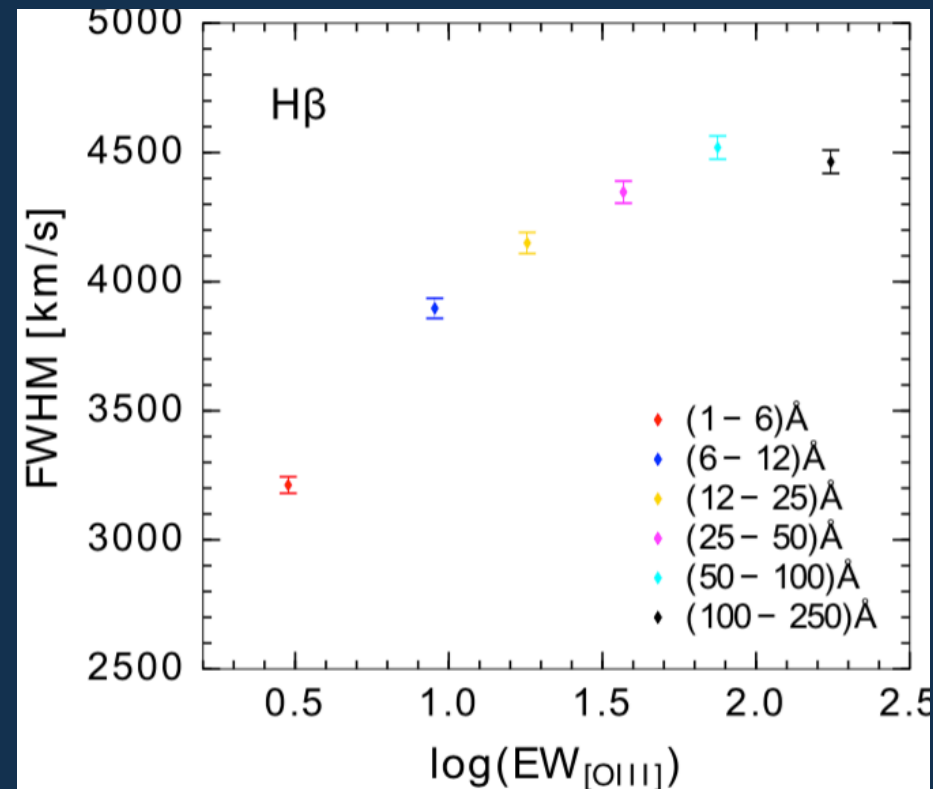
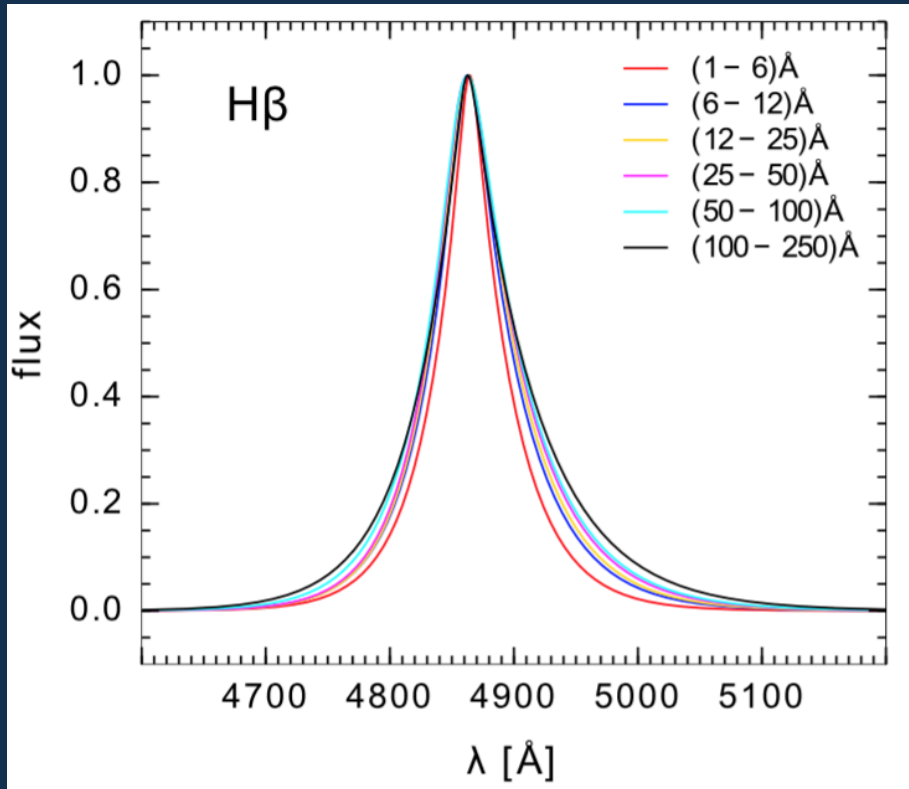
Bisogni, Marconi, Risaliti 2017



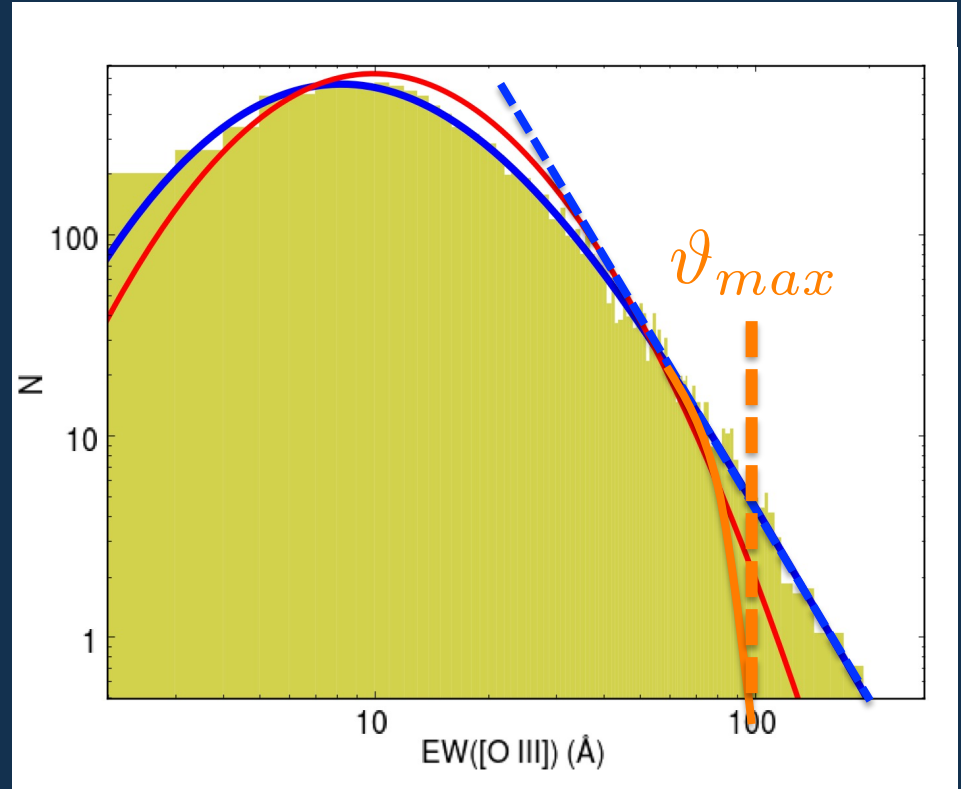
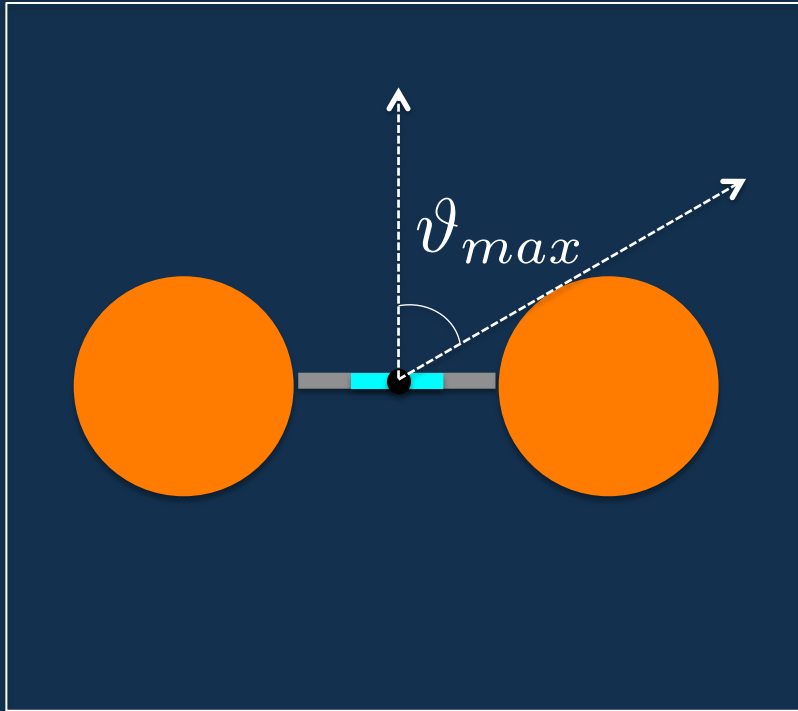
$$v_{obs} = v_{int} \sin \vartheta$$

# EW[OIII] and broad lines

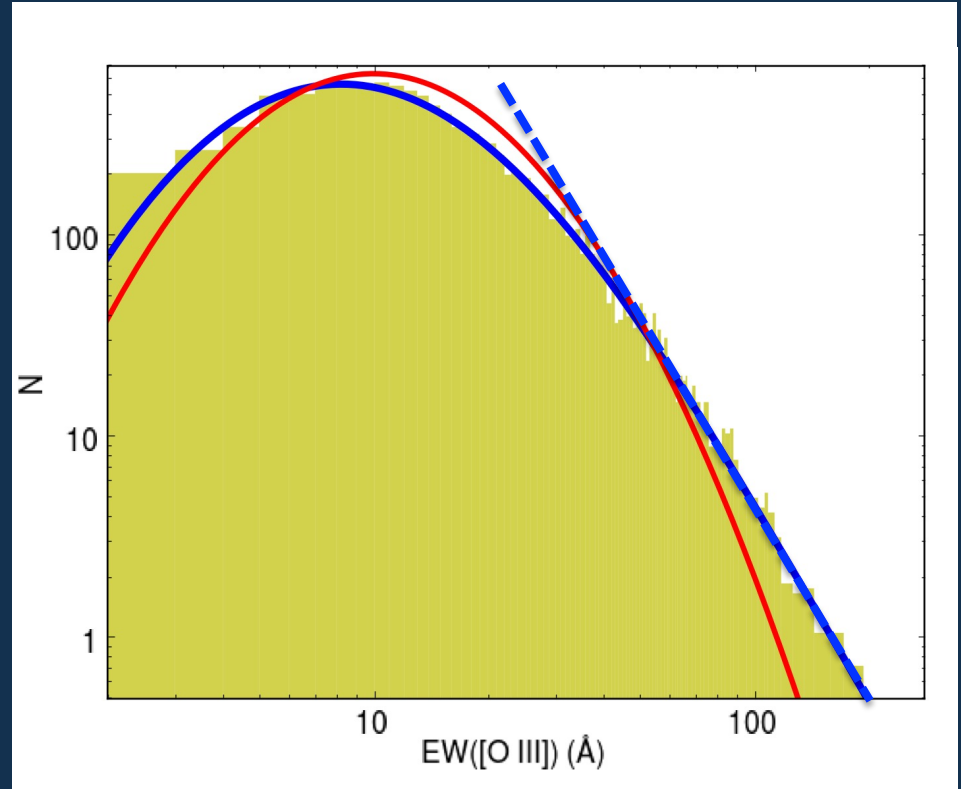
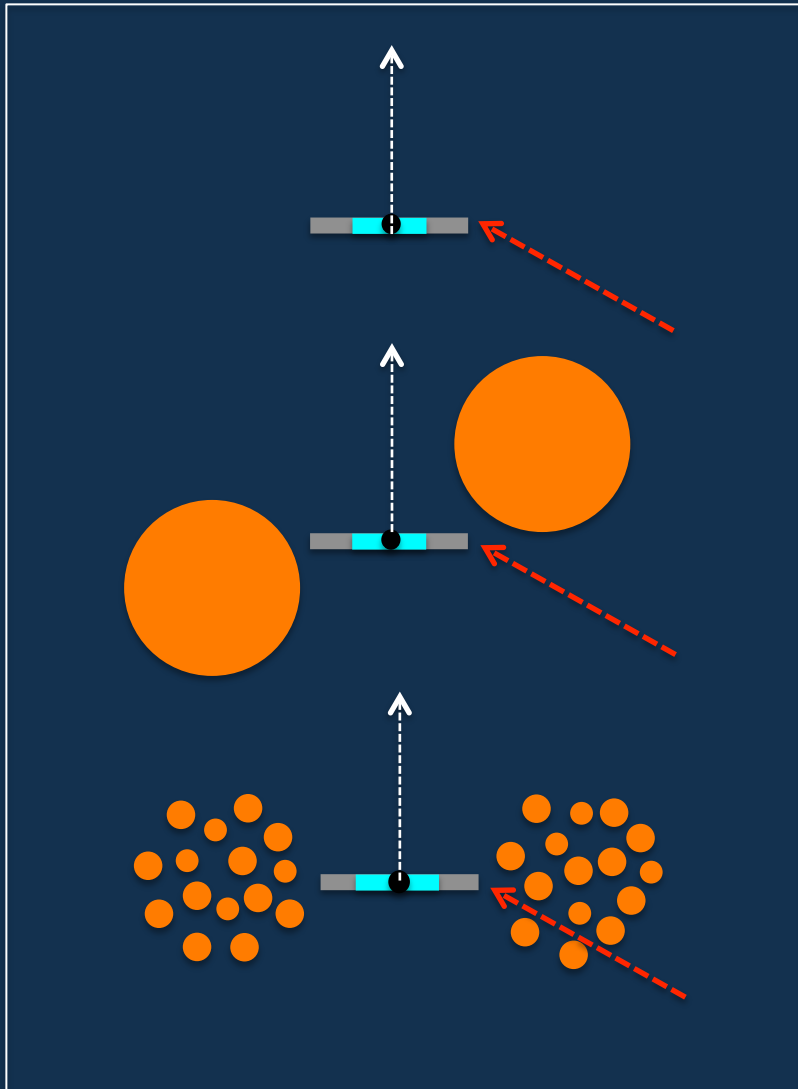
Bisogni, Marconi, Risaliti 2017



# EW[OIII] and IR SED



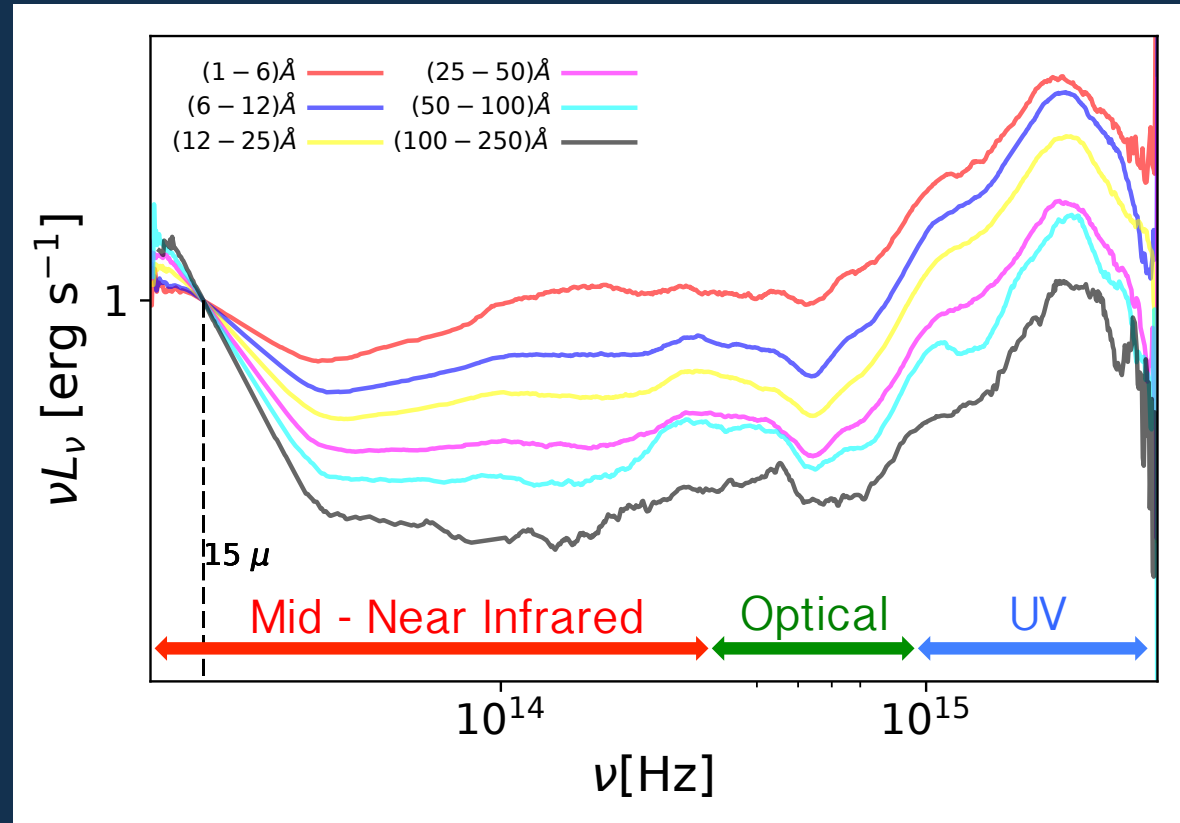
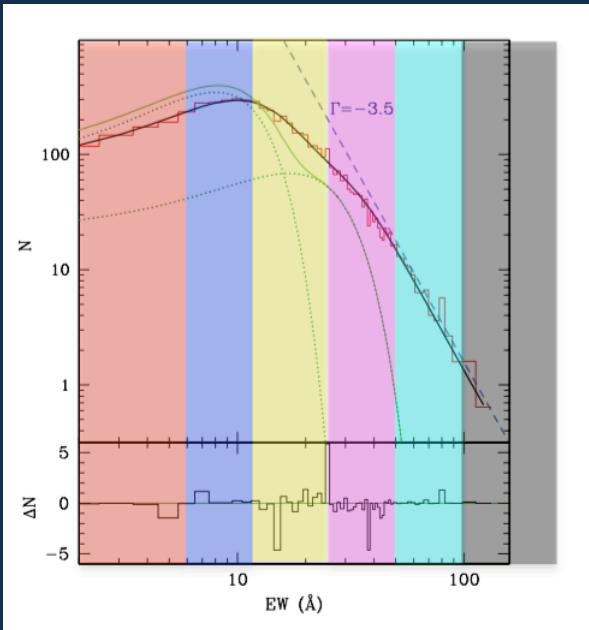
# EW[OIII] and IR SED



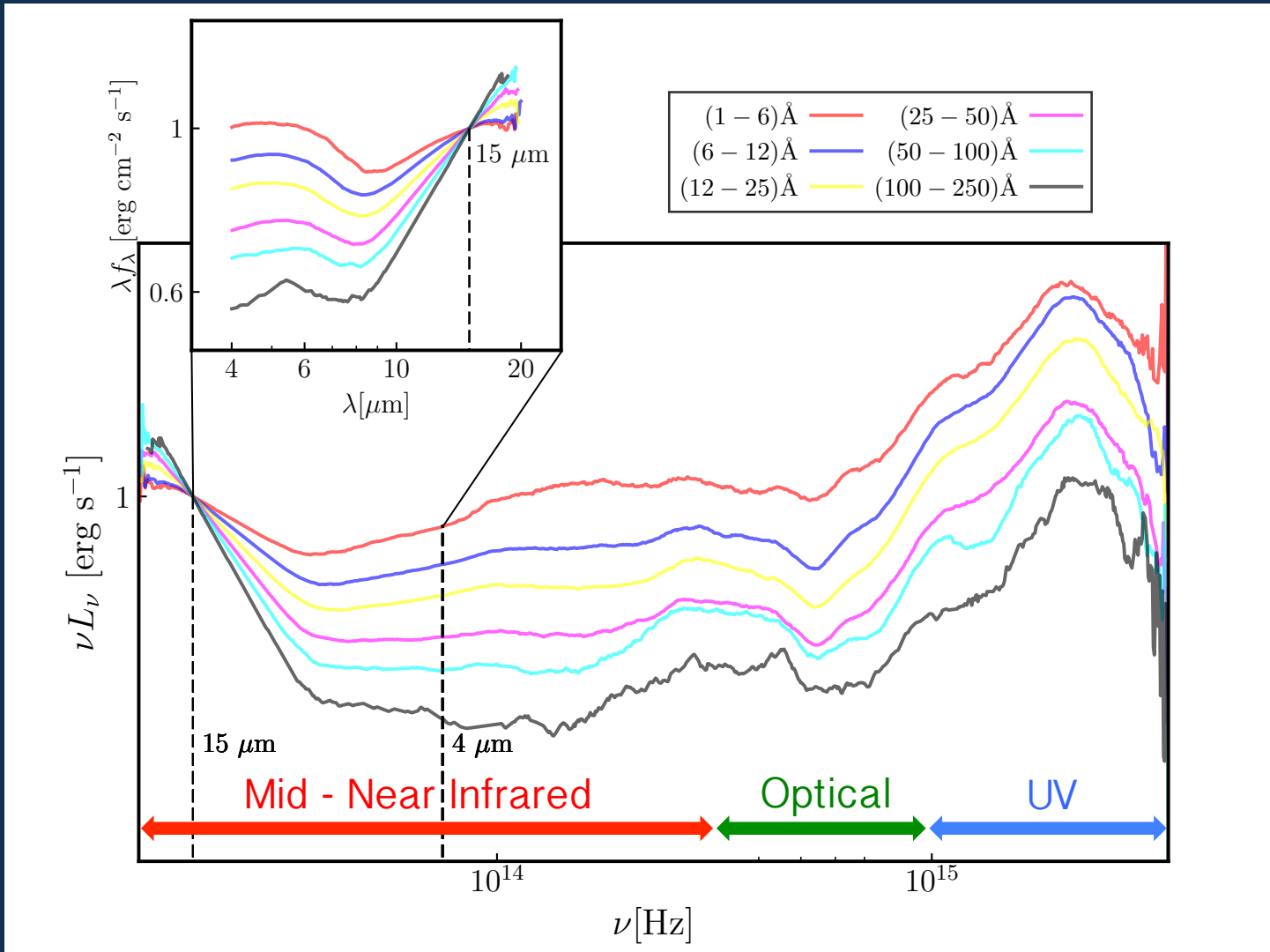
# EW[OIII] and SED of quasars: the data

GALEX, SDSS, 2MASS, WISE photometric data

>12000 blue objects  
from SDSS DR7



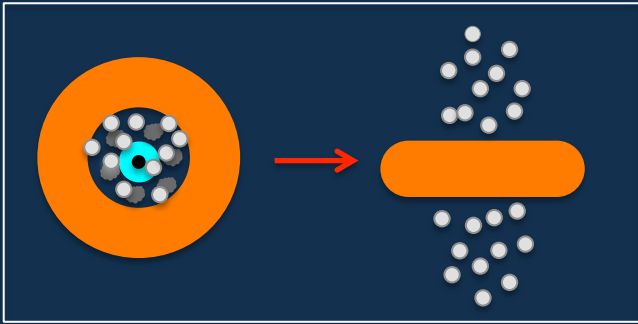
# EW[OIII] and IR SED: the data



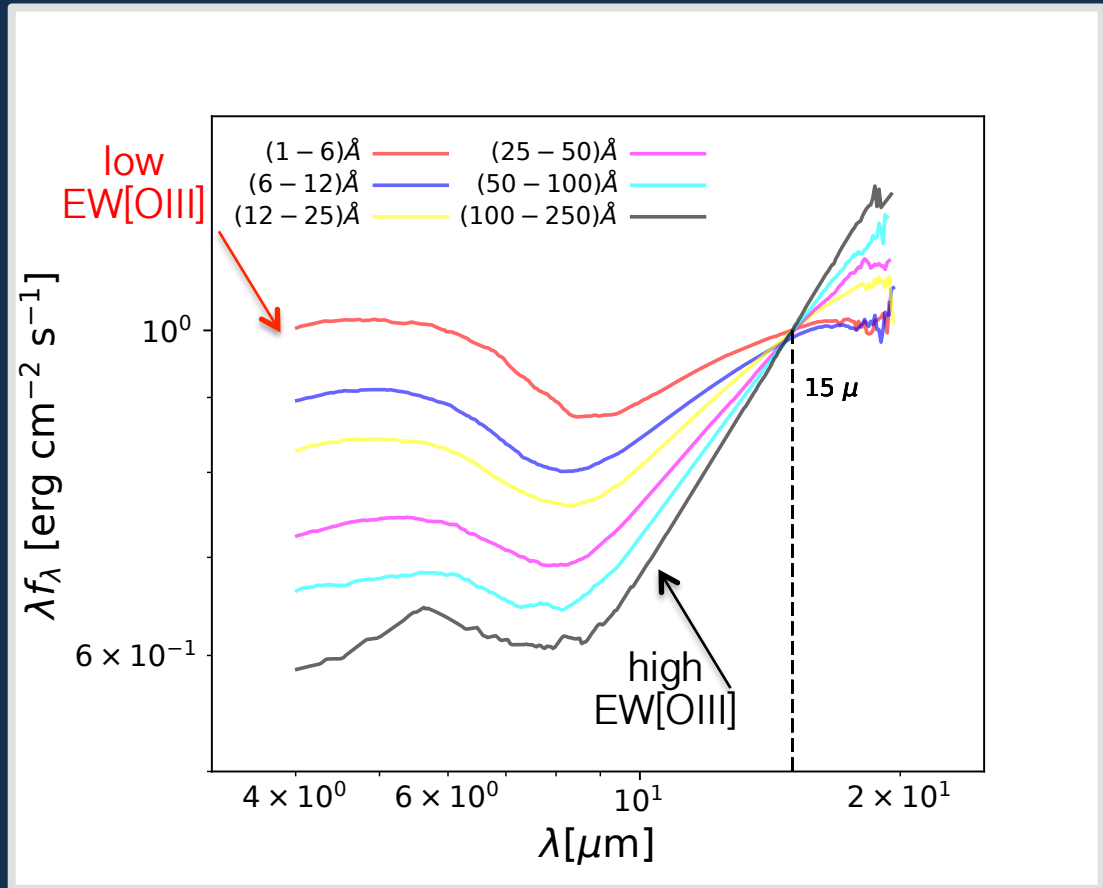
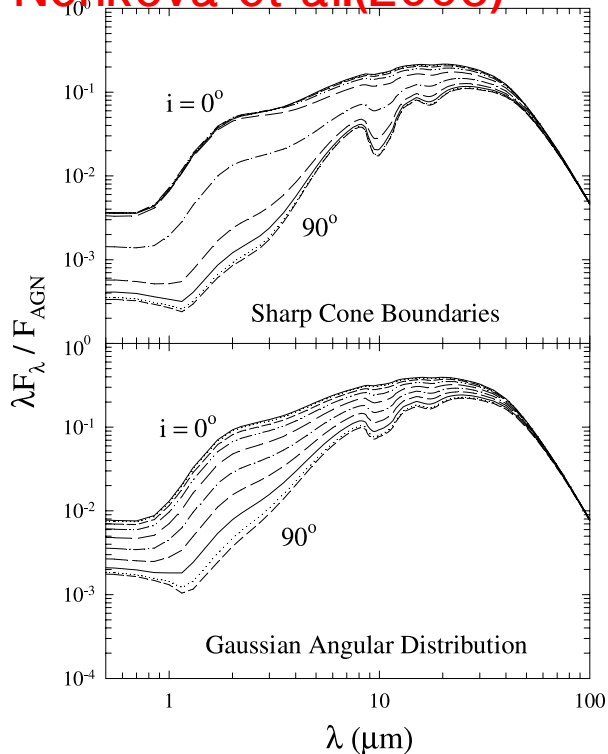
Bisogni et al. 2018, in prep.

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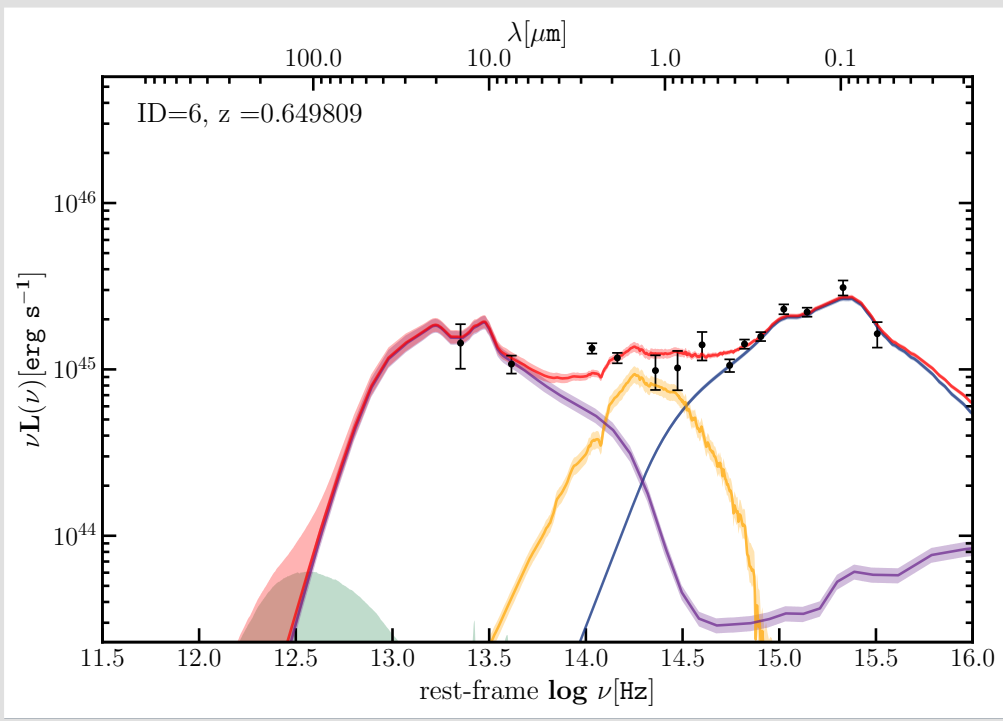
# EW[OIII] and IR SED: the data



Nenkova et al.(2008)

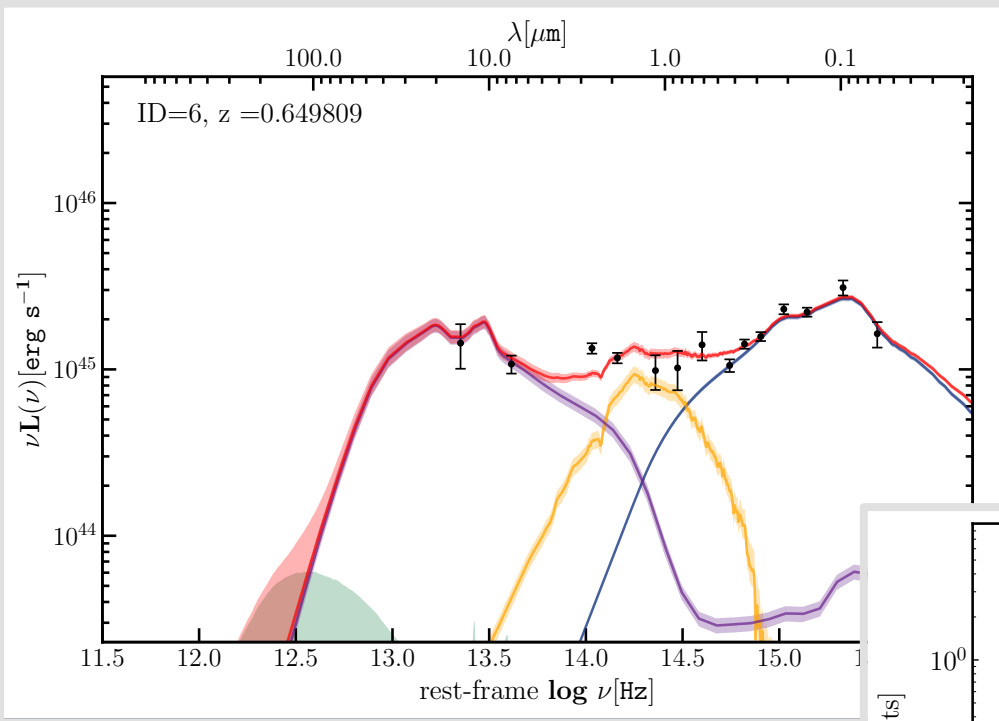


# SED fitting



SED fitting with *AGNfitter*  
Calistro-Rivera et al.(2016)

# SED fitting



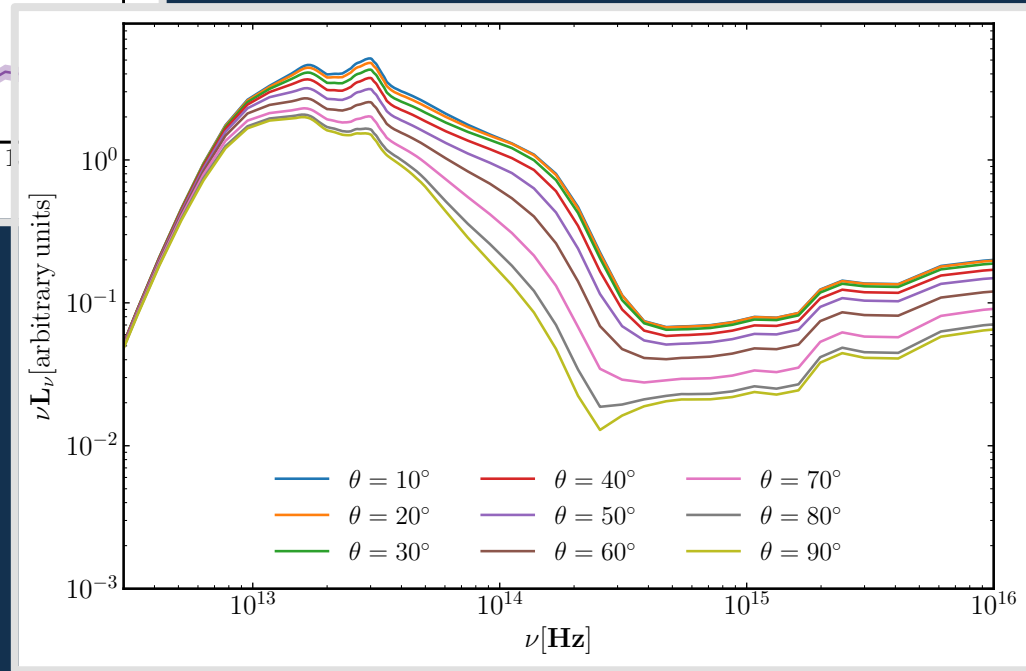
Torus templates from CLUMPY library ( $>10^6$  templates)

Nenkova et al. (2008)

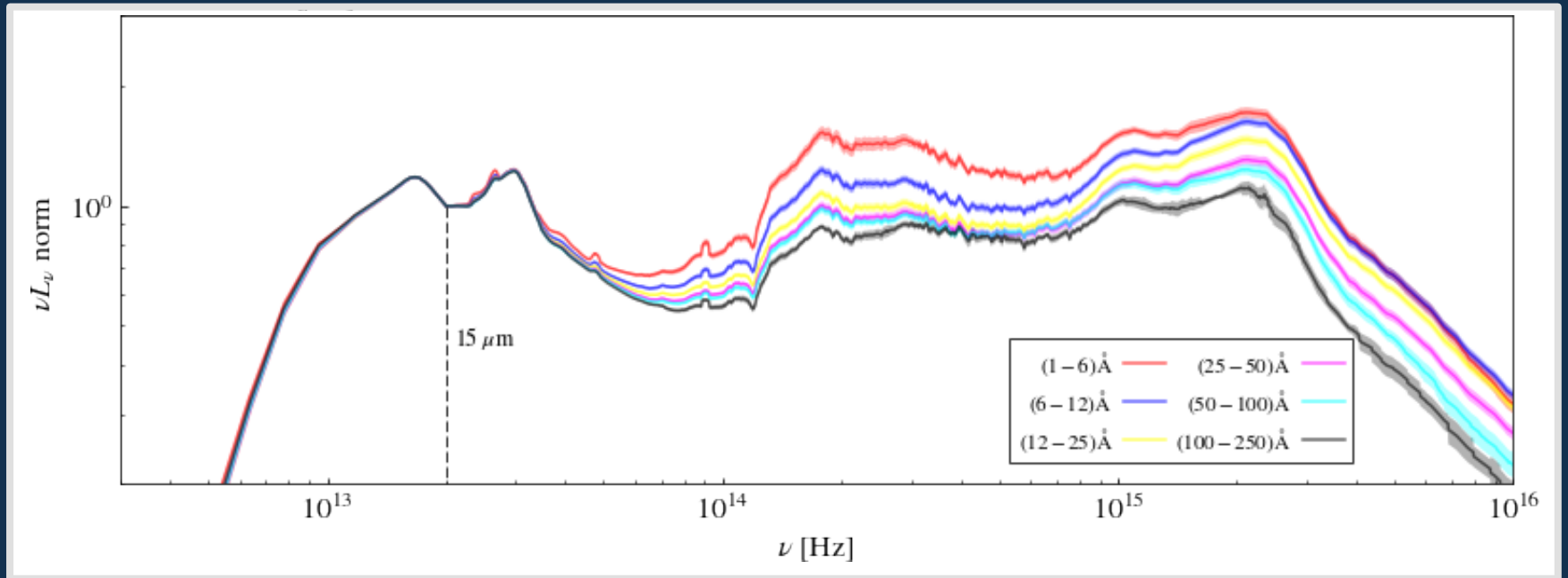
Nikutta et al. (2009)

$$Y = R_0/R_d; r^{-q}; e^{-|\beta/\sigma|^m}$$
$$\tau_V; N_0; \vartheta$$

SED fitting with *AGNfitter*  
Calistro-Rivera et al. (2016)

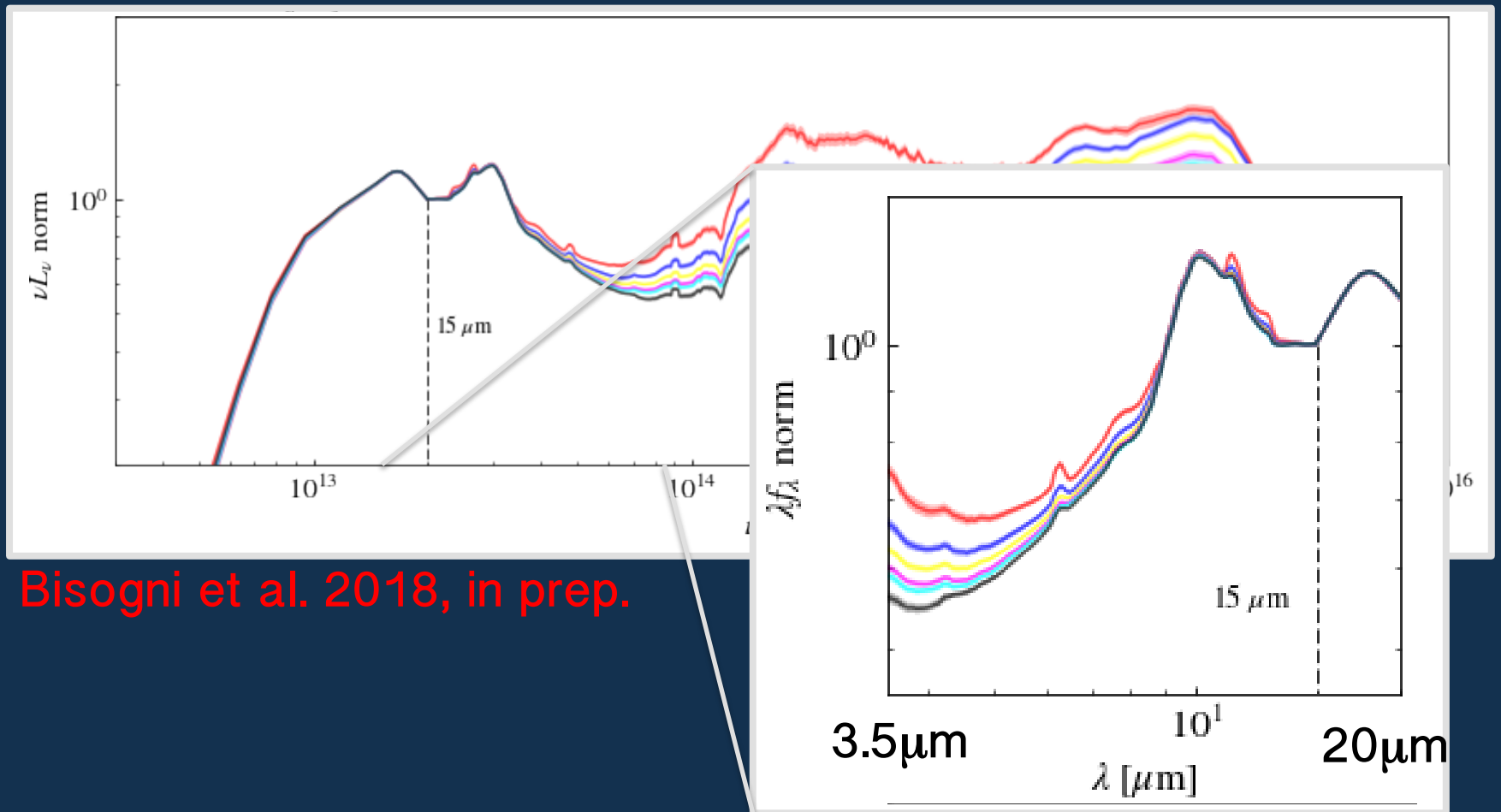


# Results



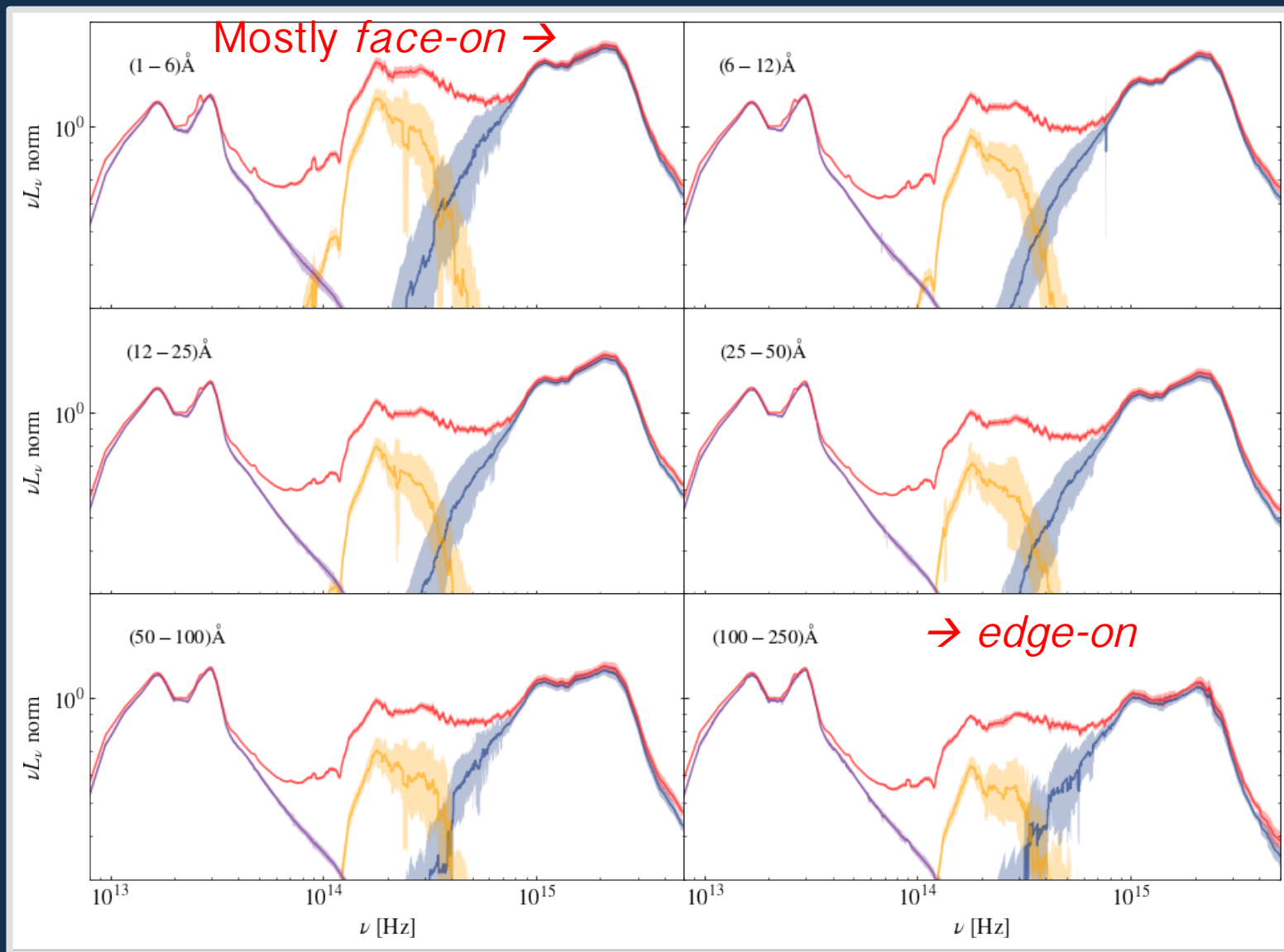
Bisogni et al. 2018, in prep.

# Results

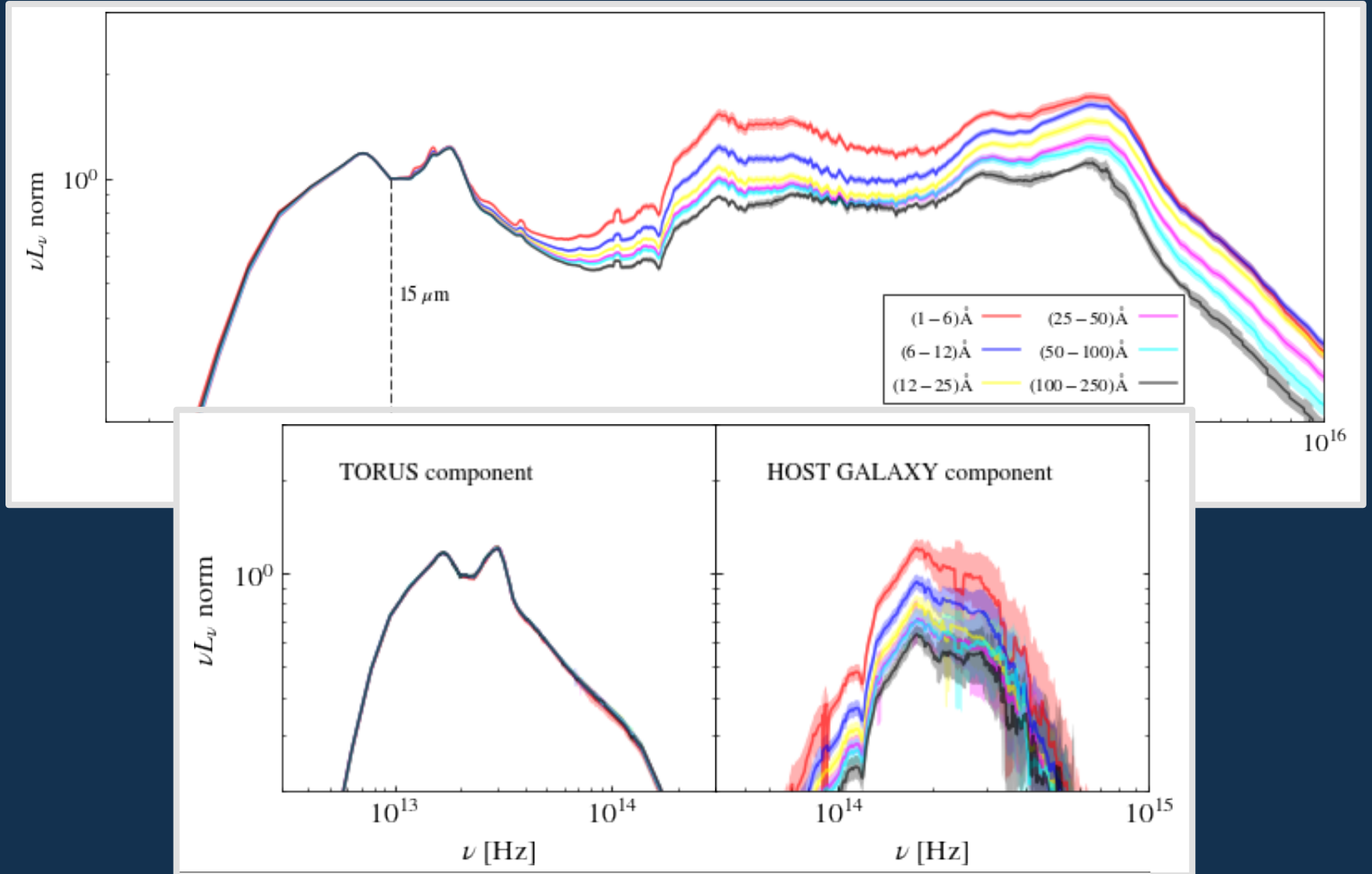


Bisogni et al. 2018, in prep.

# Results



# Results

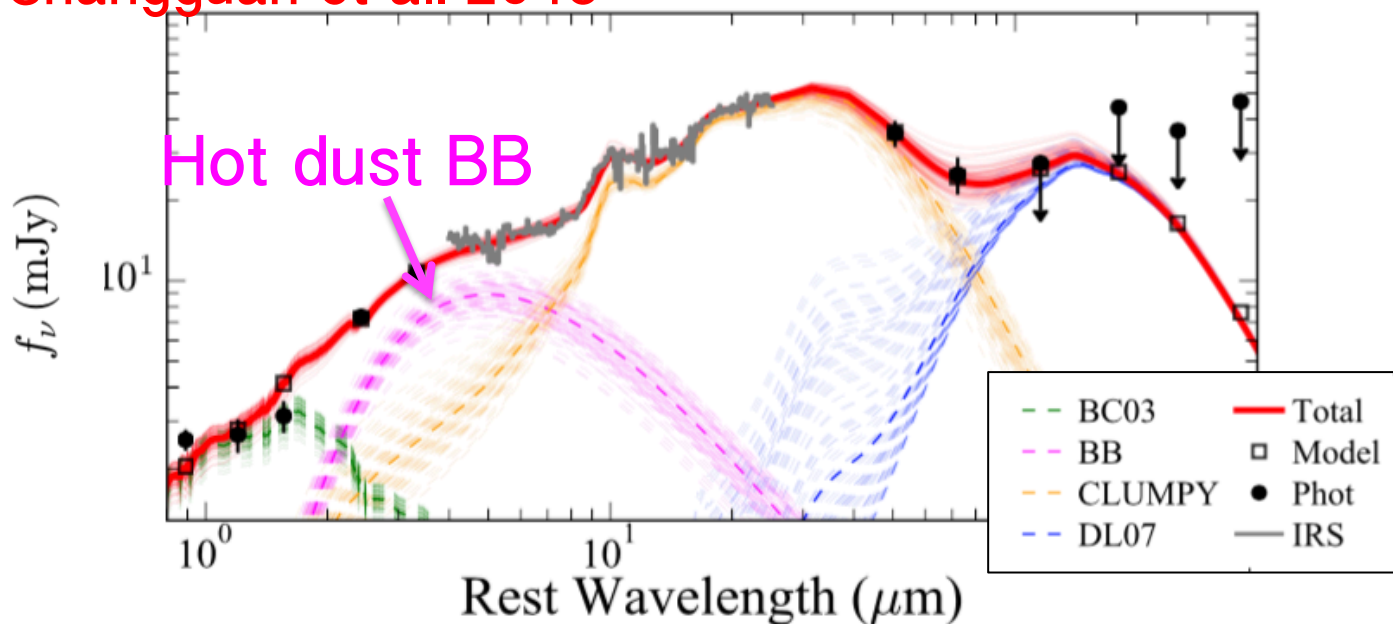


# A missing component?

Hot dust Black Body  $T \sim 1000\text{-}1900\text{ K}$

Mor et al. 2009-2011, Deo et al. 2011,  
Mor & Netzer 2012, Garcia-Gonzalez et  
al. 2017, Hoenig & Kishimoto 2017...

Shangguan et al. 2018

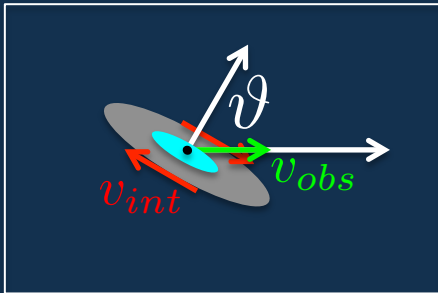


# Conclusions

Knowing source orientation allows us to:

→ optical:

- Connect emissions shape to geometry  
→ morphological study of unresolved, inner regions
- Correct virial mass estimates for non edge-on sources



$$M_{\bullet} = f \frac{v_{int}^2 R_{BLR}}{G} = f \frac{\left(\frac{v_{obs}}{\sin i}\right)^2 R_{BLR}}{G}$$

→ IR:

- Data in agreement with models in literature:  
→ torus clumpy and co-axial with disk and BLR
- Further analysis is needed to disentangle the torus contribution

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