Orientation effects on quasars SED
The torus IR emission

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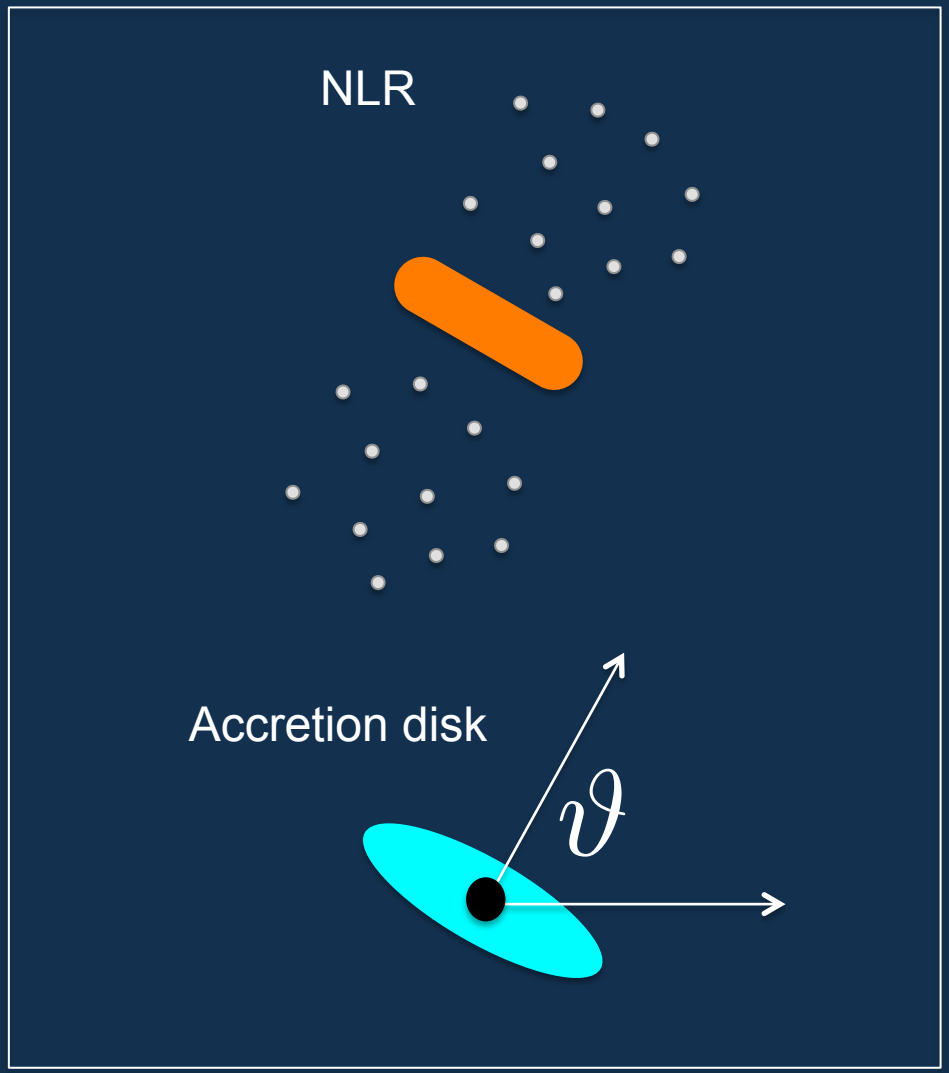
The longstanding problem

The longstanding problem



Risaliti, Salvati, Marconi 2011

$L_{[OIII]}$ ISOTROPIC

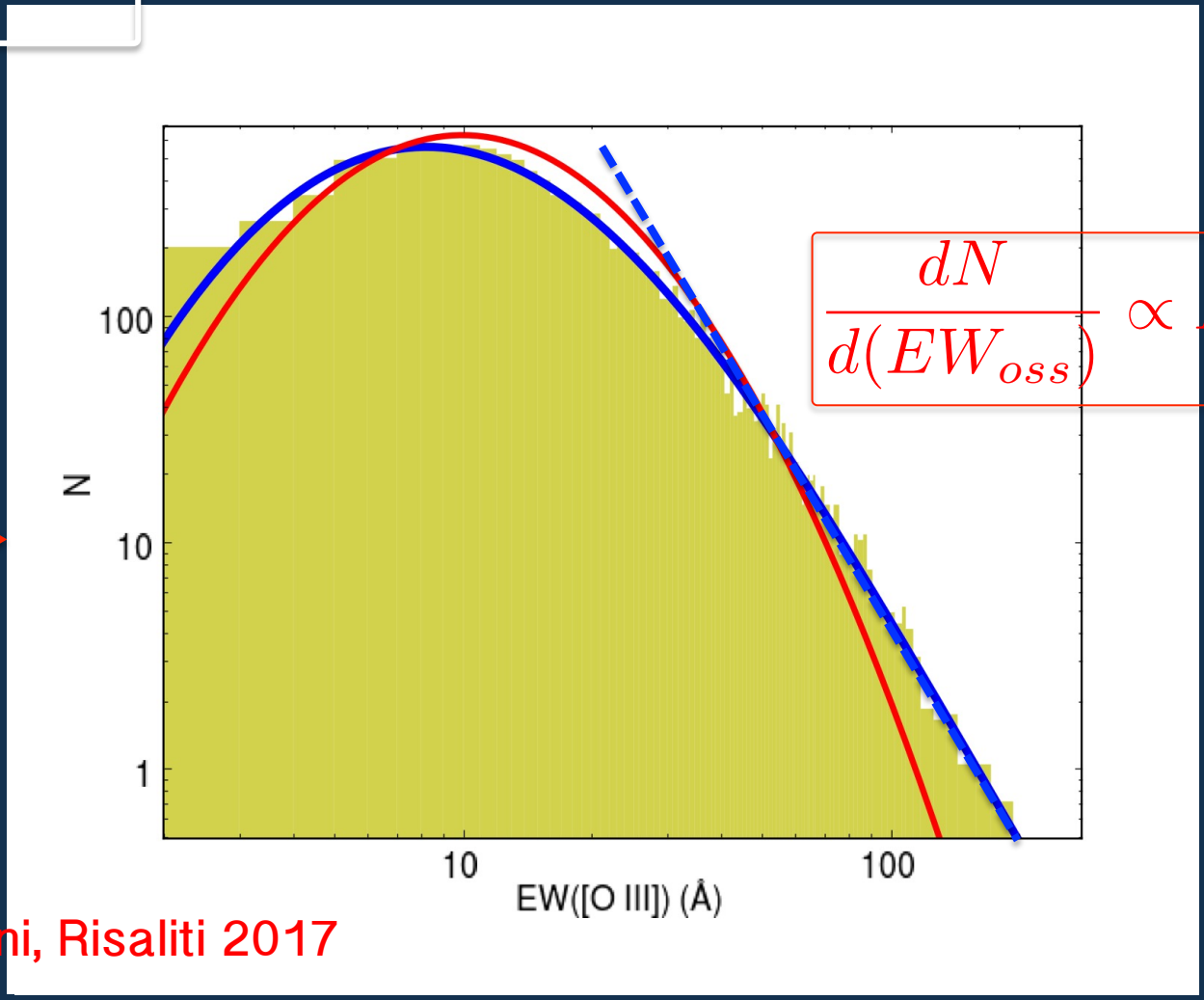
$$L_{DISK_{obs}} = L_{DISK_{int}} \cos\vartheta$$

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

EW[OIII] as an orientation indicator

~ 12000 blue objects
SDSS DR7

FLUX-LIMITED sample

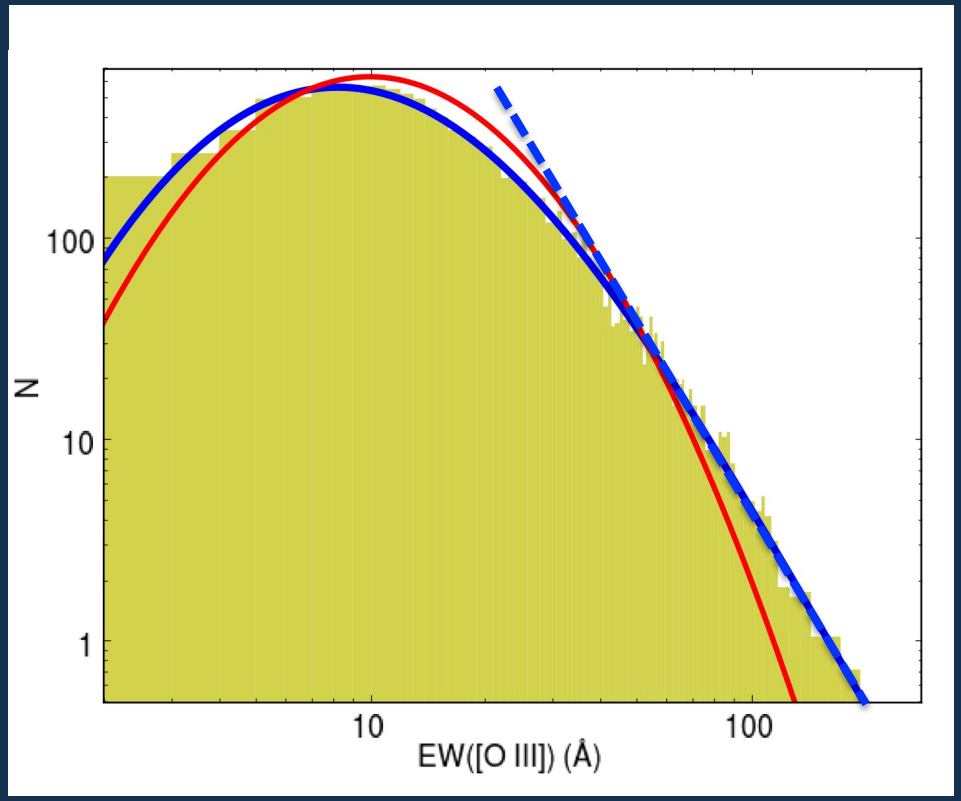


$$\frac{dN}{d(EW_{oss})} \propto EW_{oss}^{-3.5}$$

Bisogni, Marconi, Risaliti 2017

EW[OIII] as an orientation indicator

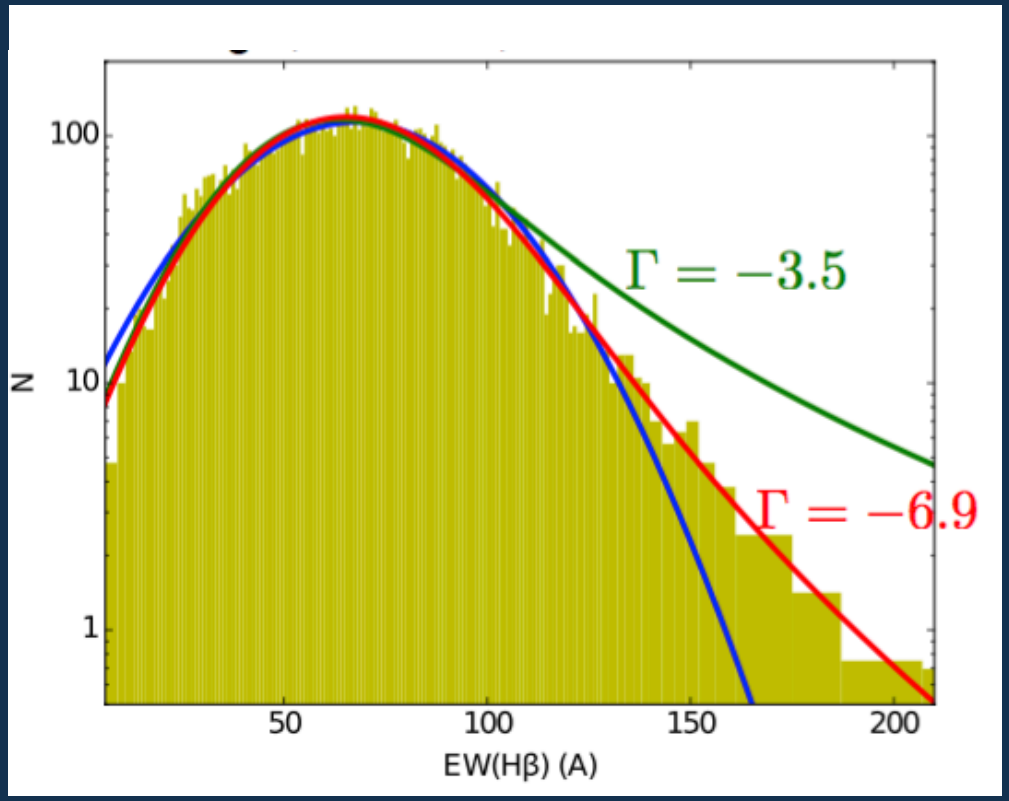
Bisogni, Marconi, Risaliti 2017



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

EW[OIII] vs Broad Lines EW

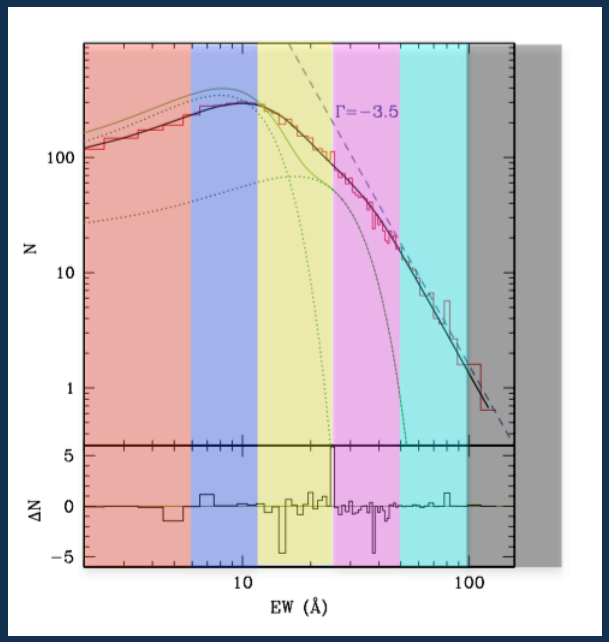
Bisogni, Marconi, Risaliti 2017



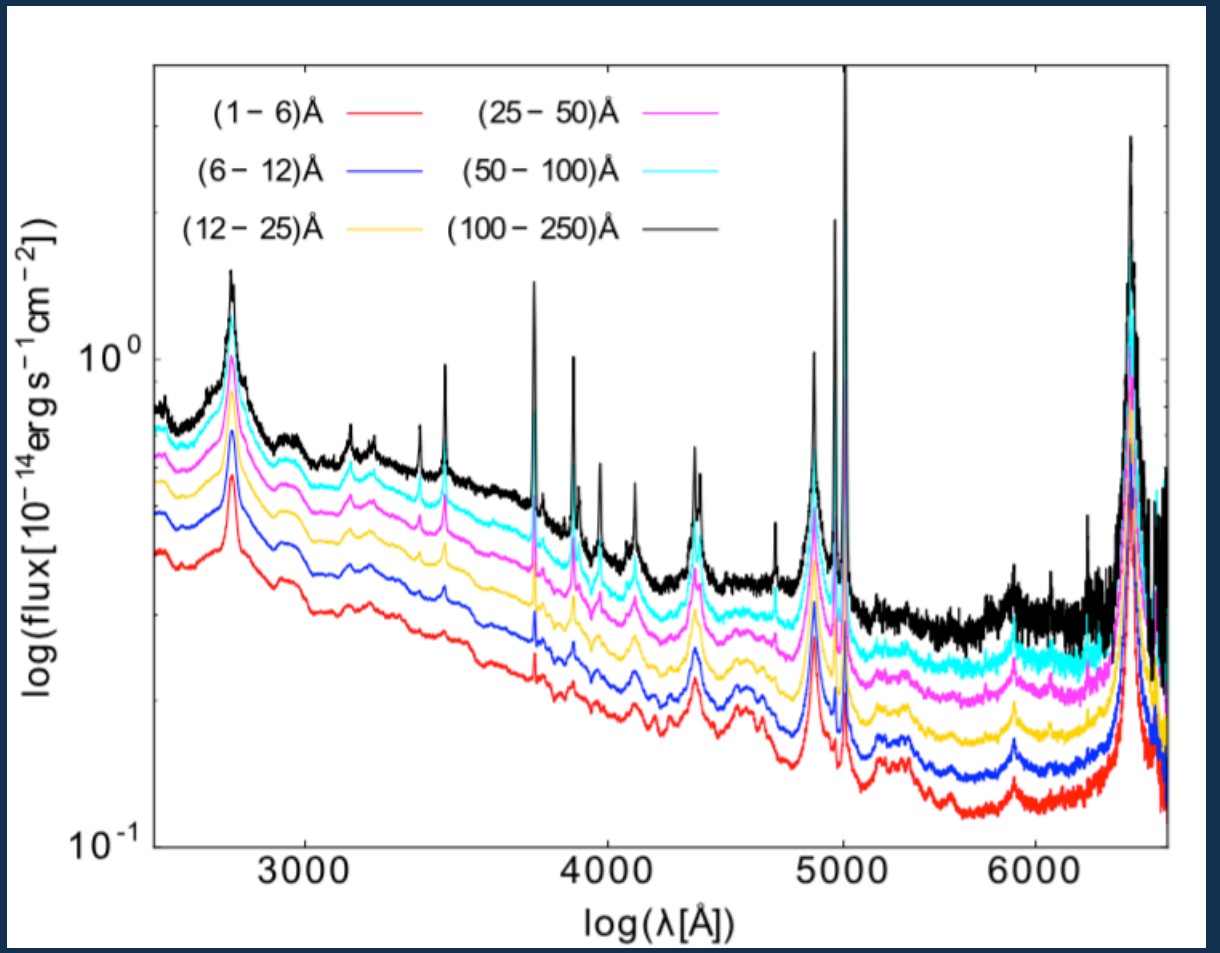
- Low EW[OIII]
  → Mostly *face-on* sources
- High EW[OIII]
  → *Edge-on* sources
- BLR → disk-shaped

EW[OIII] and optical spectral features

>12000 blue objects from SDSS DR7

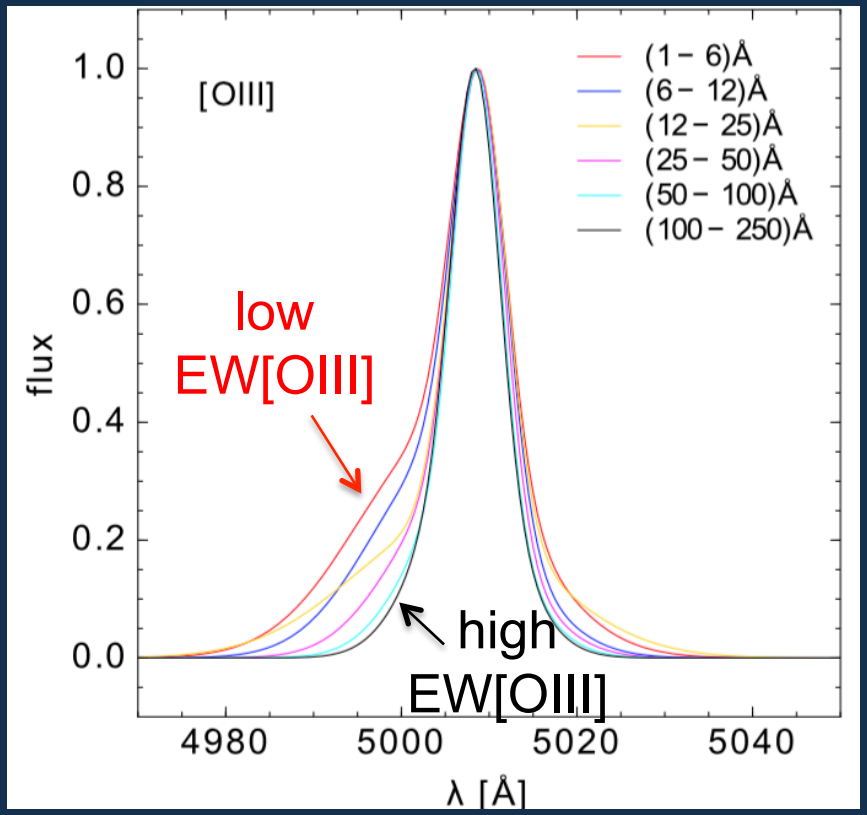


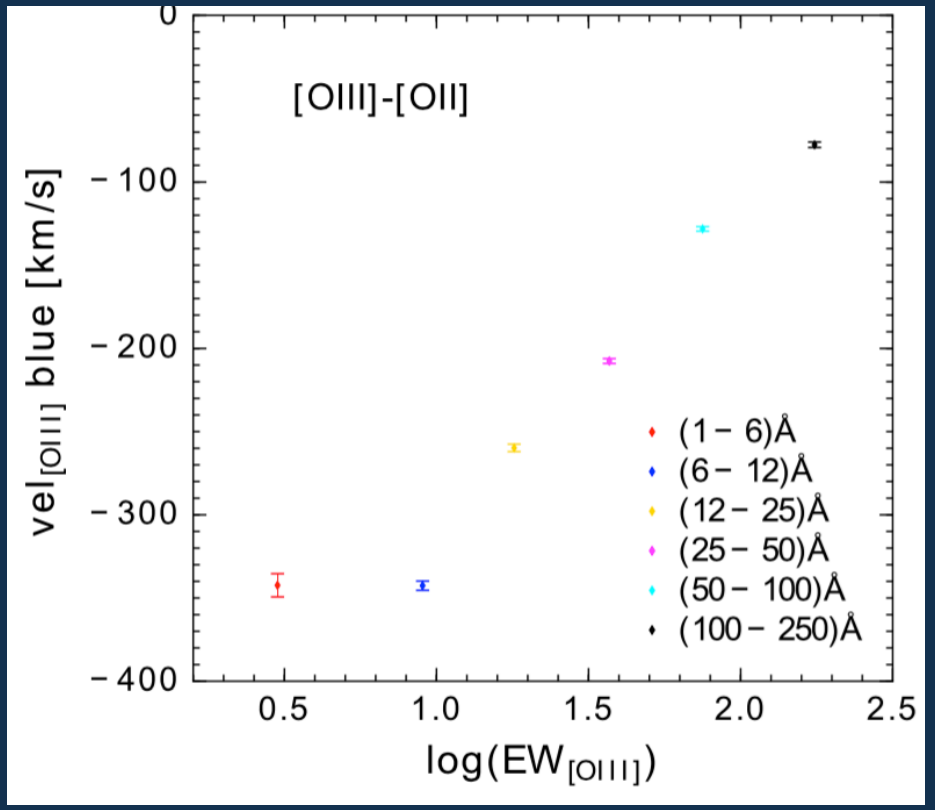
Bisogni, Marconi, Risaliti 2017



EW[OIII] and narrow lines

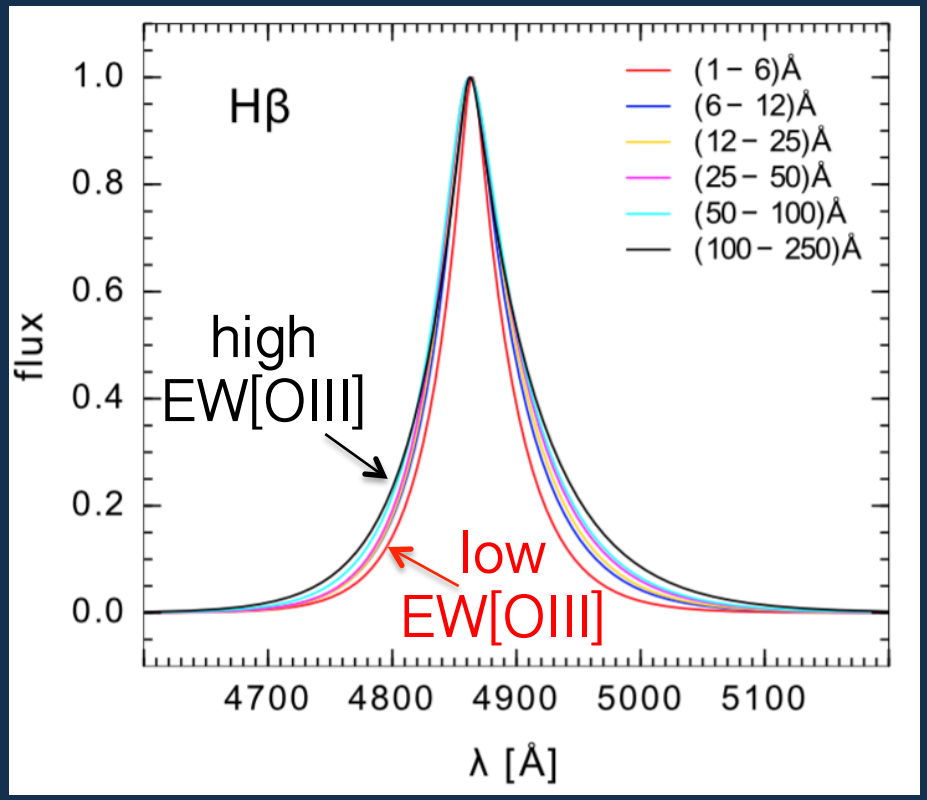
Bisogni, Marconi, Risaliti 2017

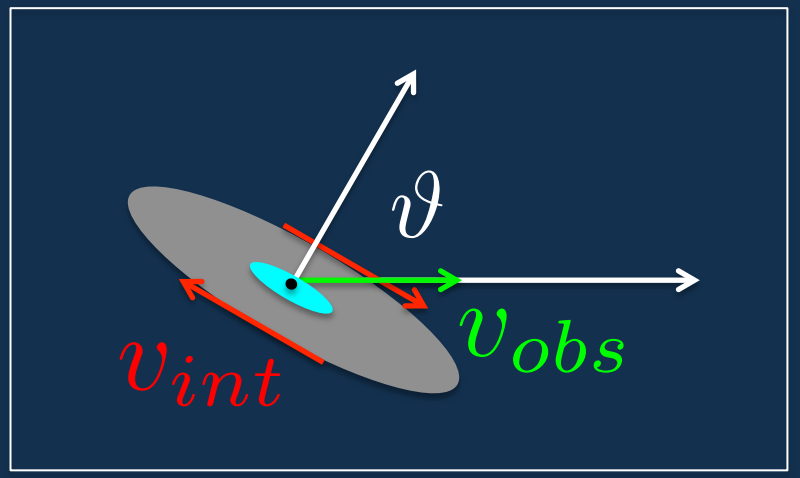




EW[OIII] and broad lines

Bisogni, Marconi, Risaliti 2017

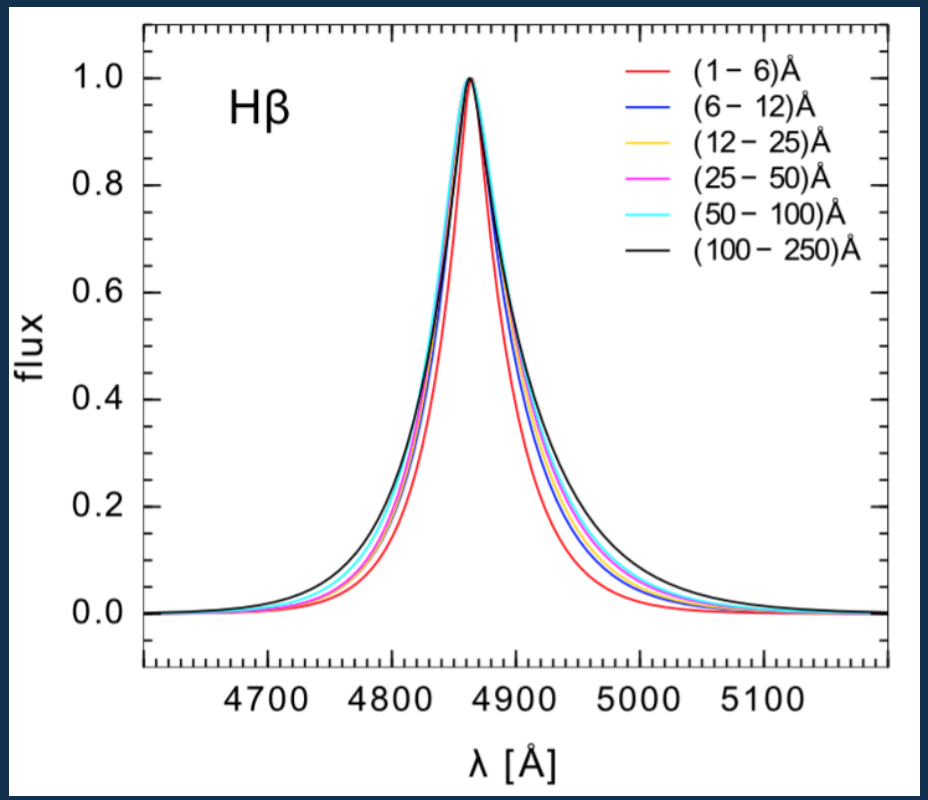


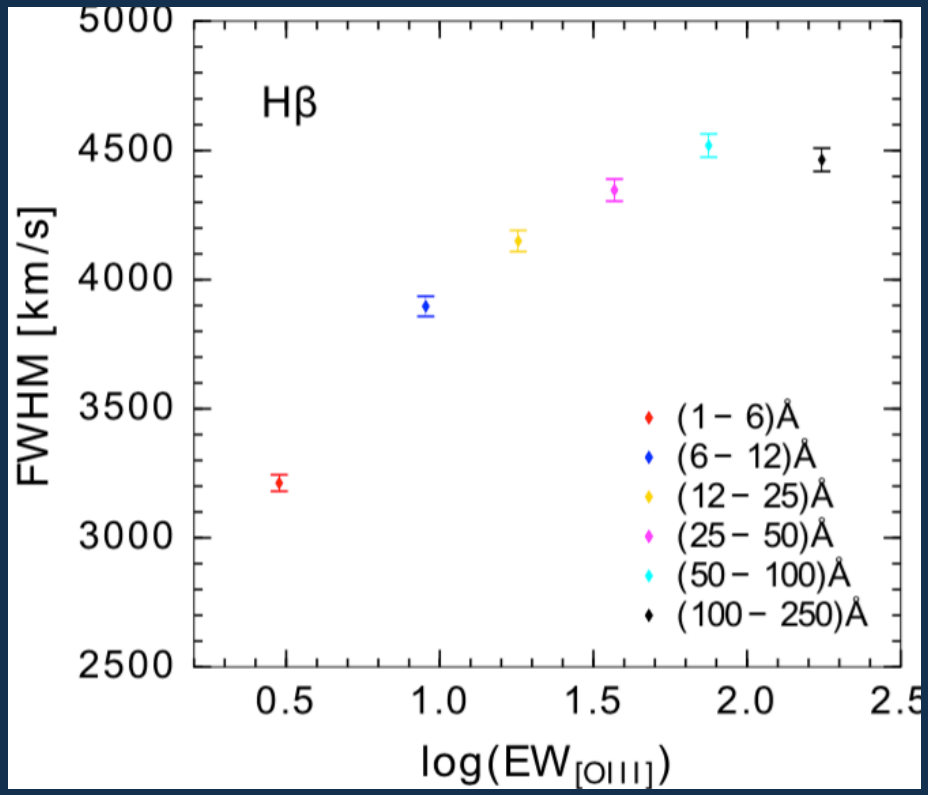


$$v_{obs} = v_{int} \sin \vartheta$$

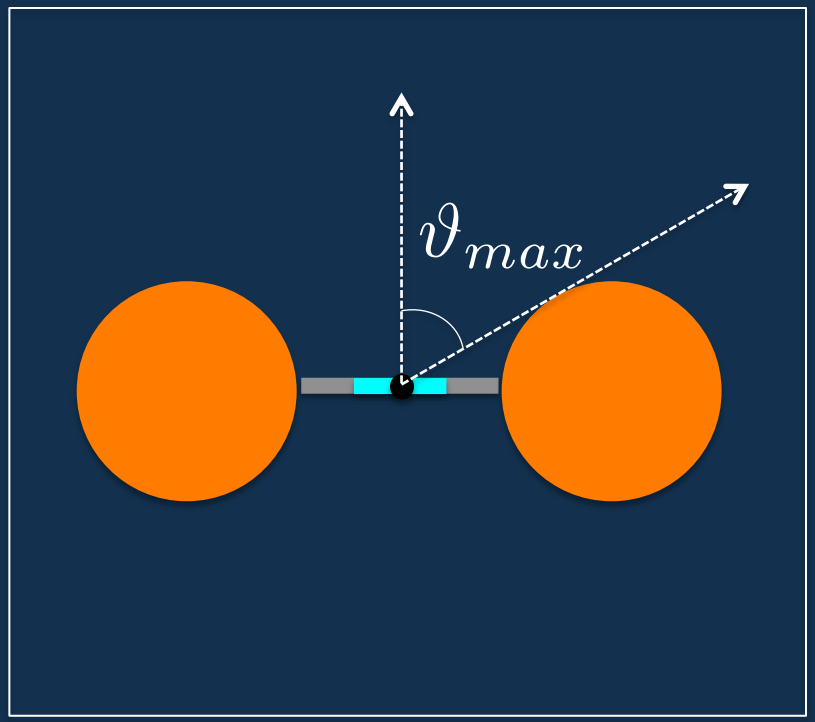
EW[OIII] and broad lines

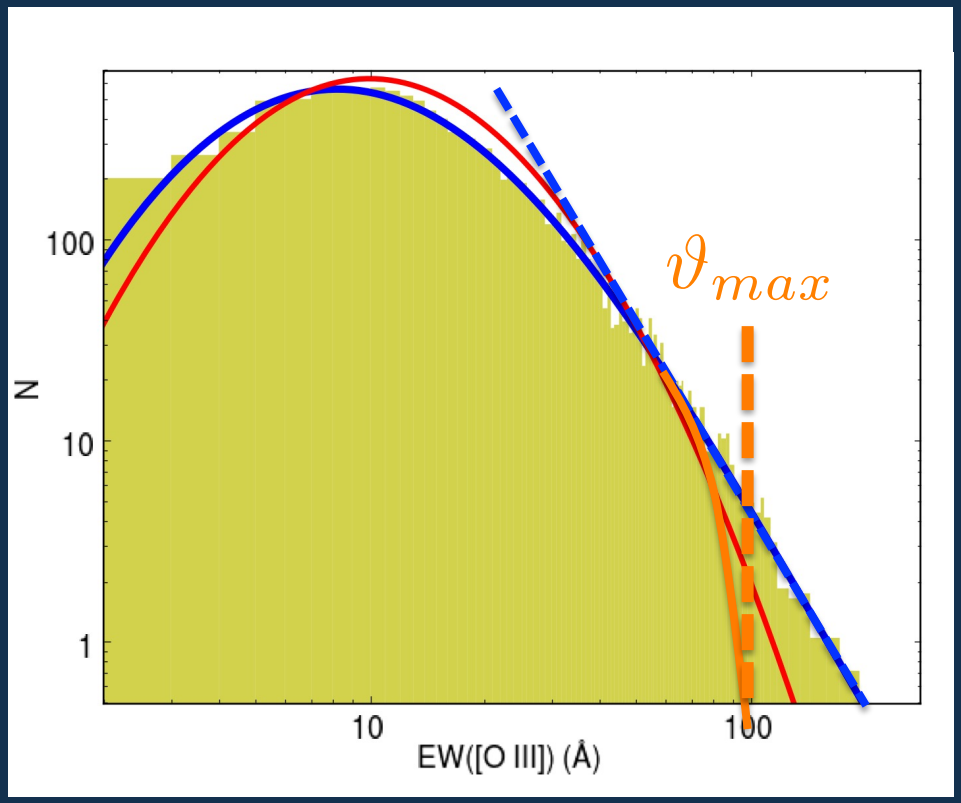
Bisogni, Marconi, Risaliti 2017



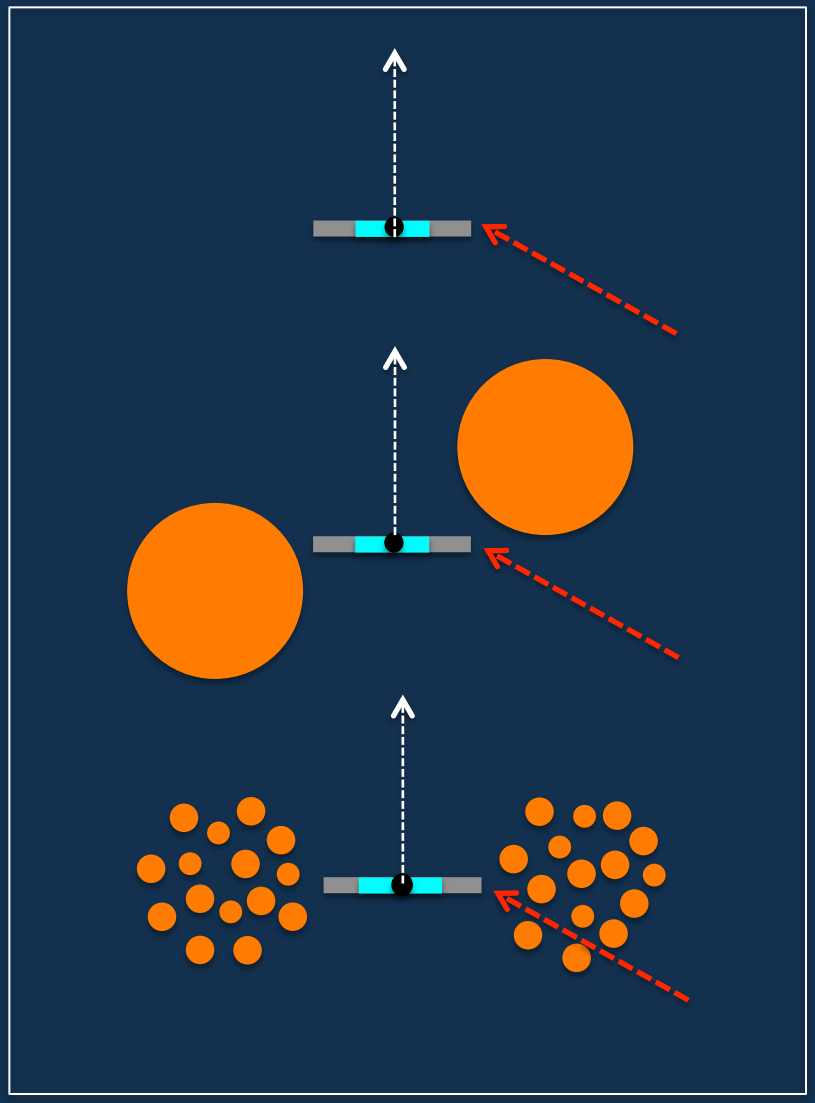


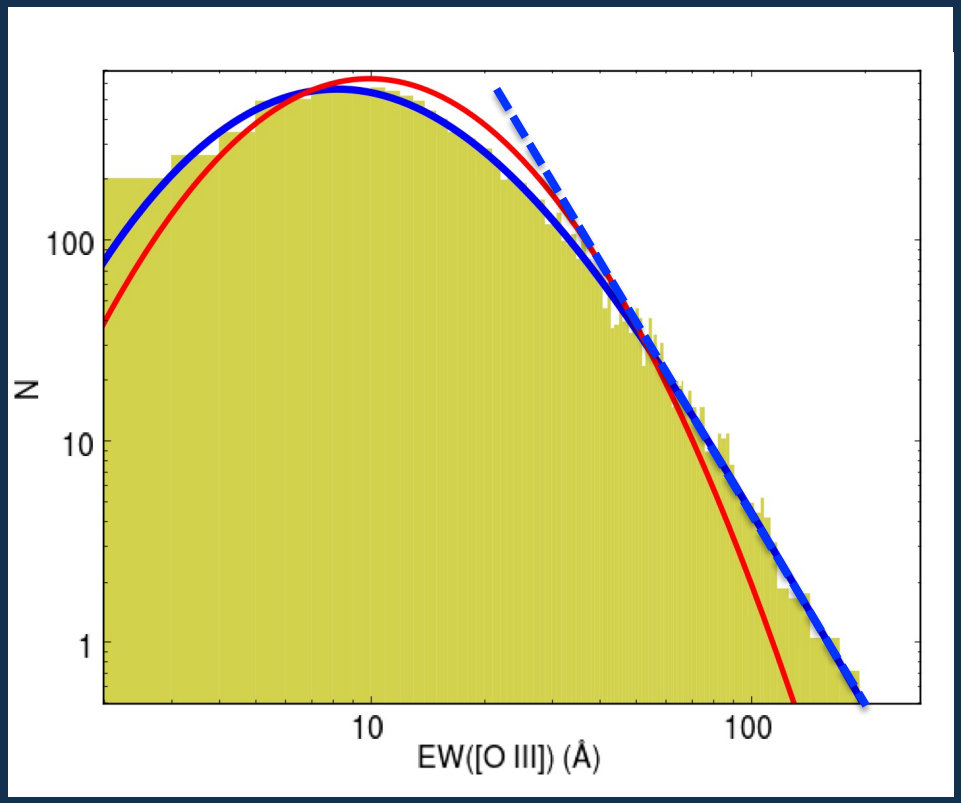
EW[OIII] and IR SED





EW[OIII] and IR SED

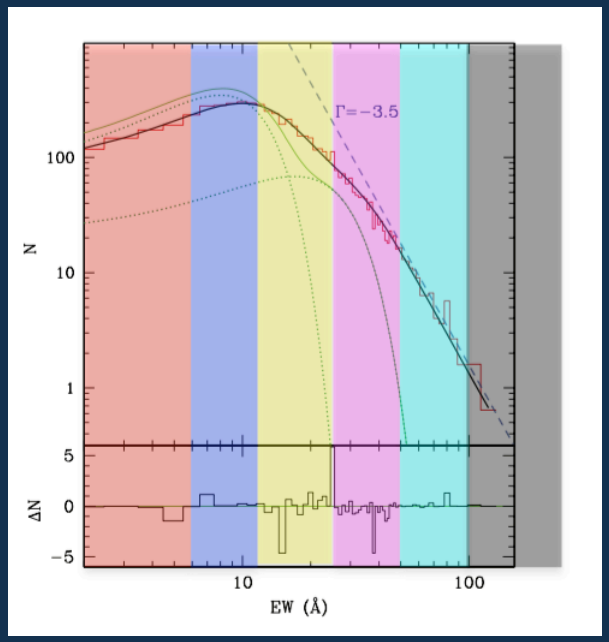


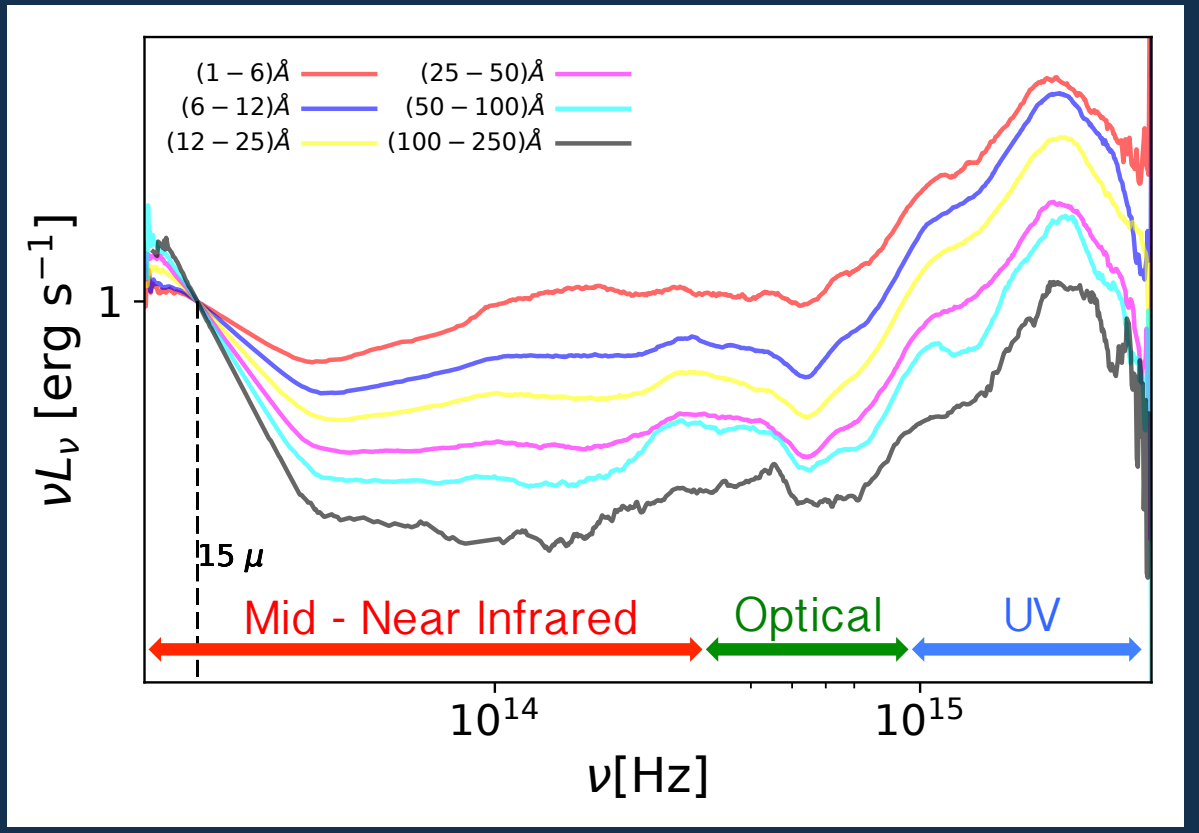


EW[OIII] and SED of quasars: the data

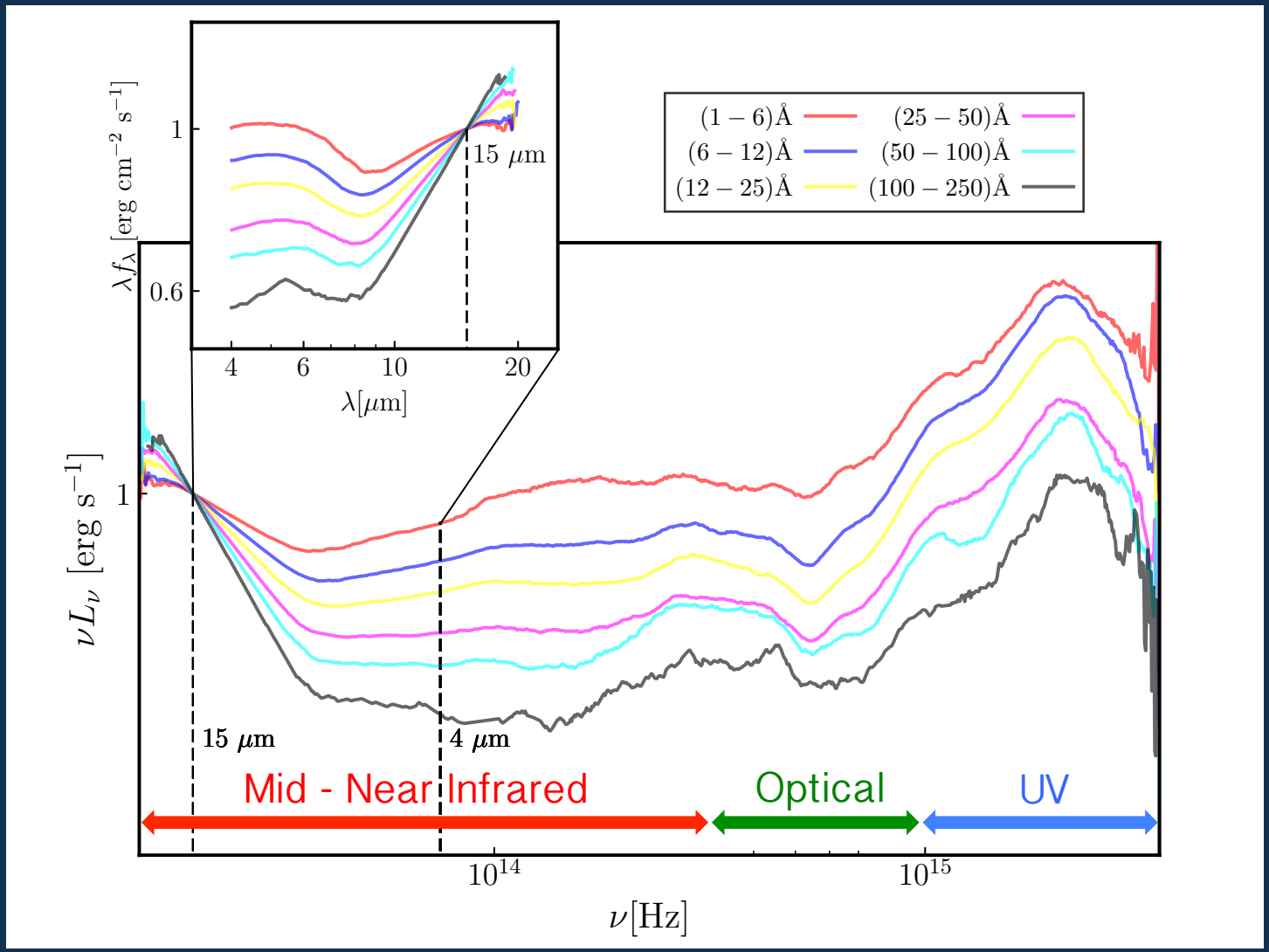
GALEX, SDSS, 2MASS, *WISE* photometric data

>12000 blue objects from SDSS DR7



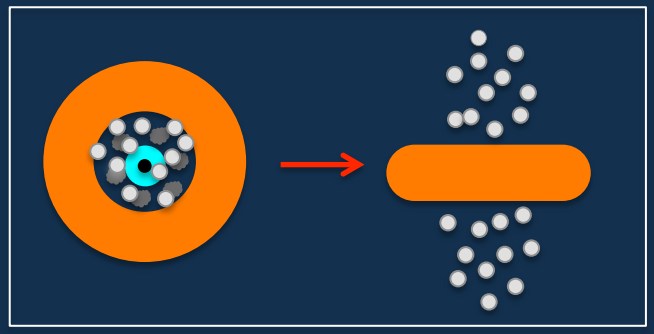


EW[OIII] and IR SED: the data

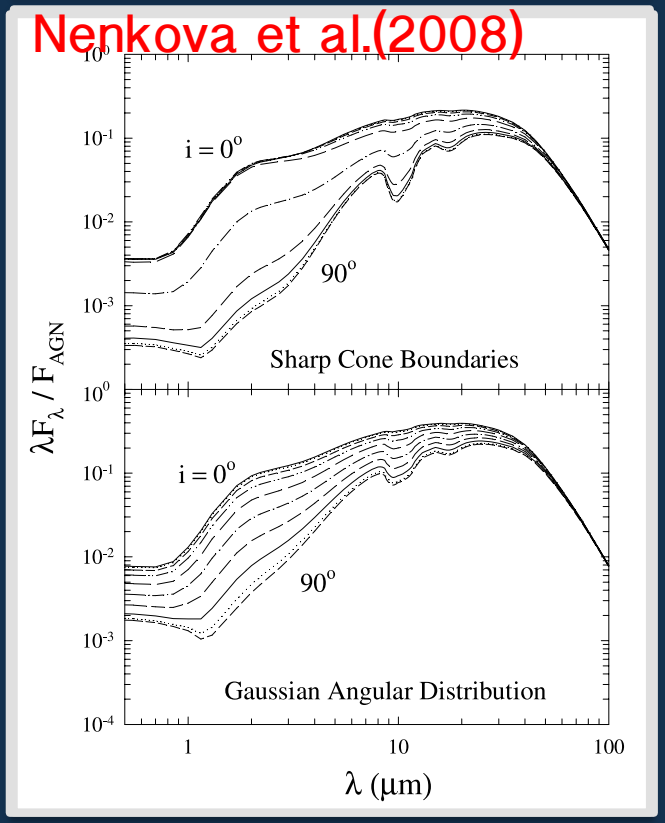


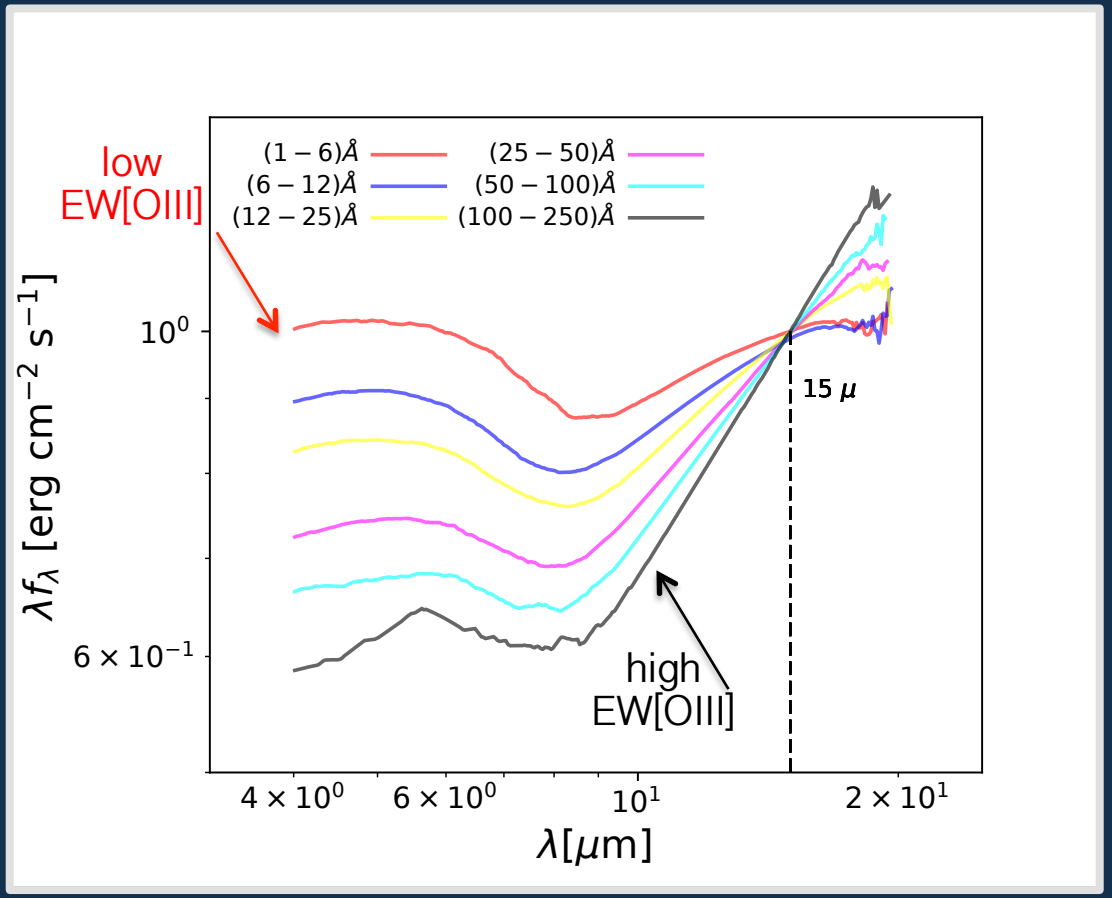
Bisogni et al. 2018, in prep.

EW[OIII] and IR SED: the data

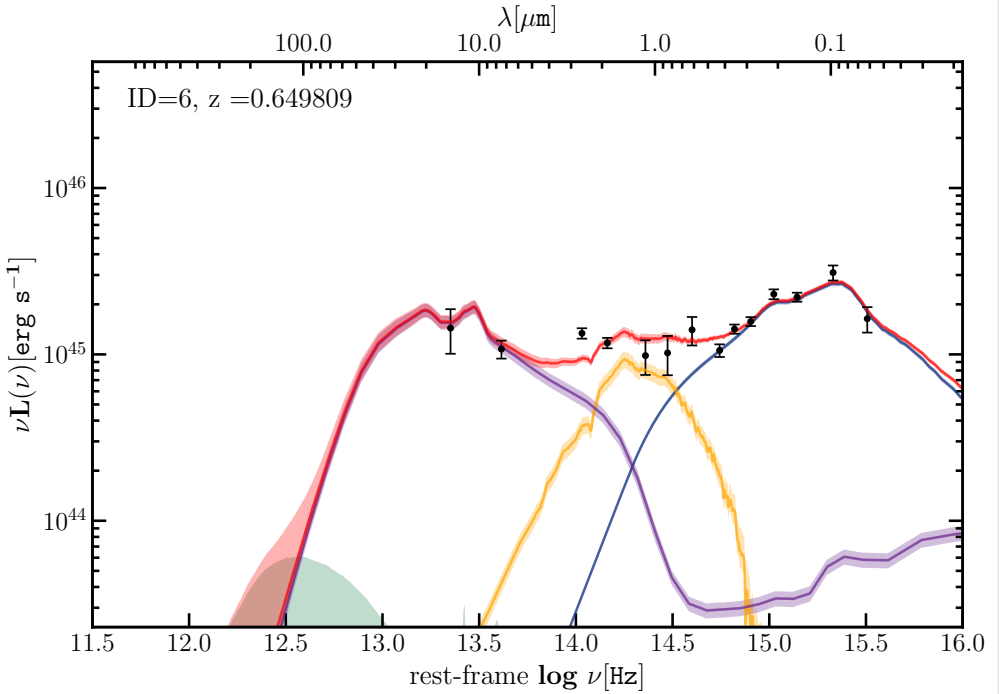


Nenkova et al.(2008)



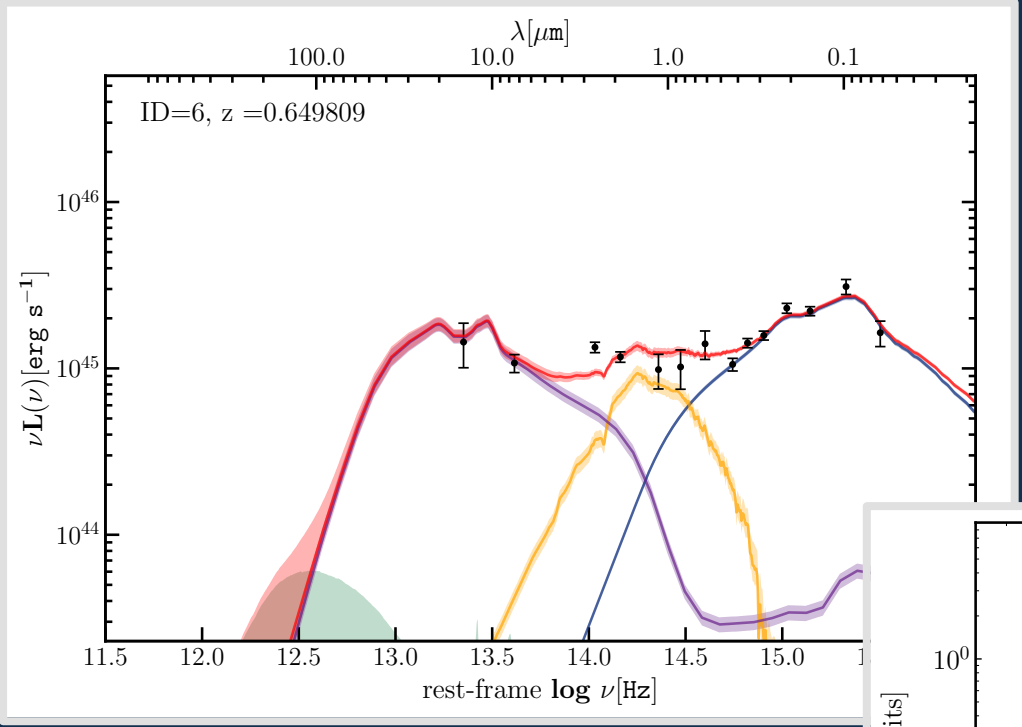


SED fitting



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

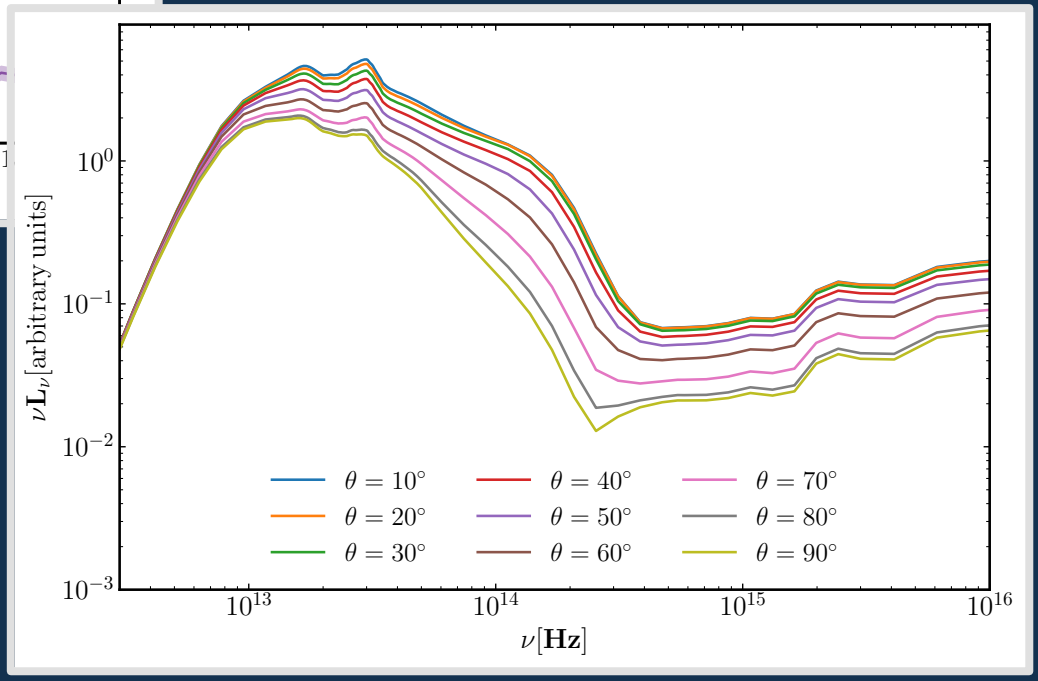
SED fitting



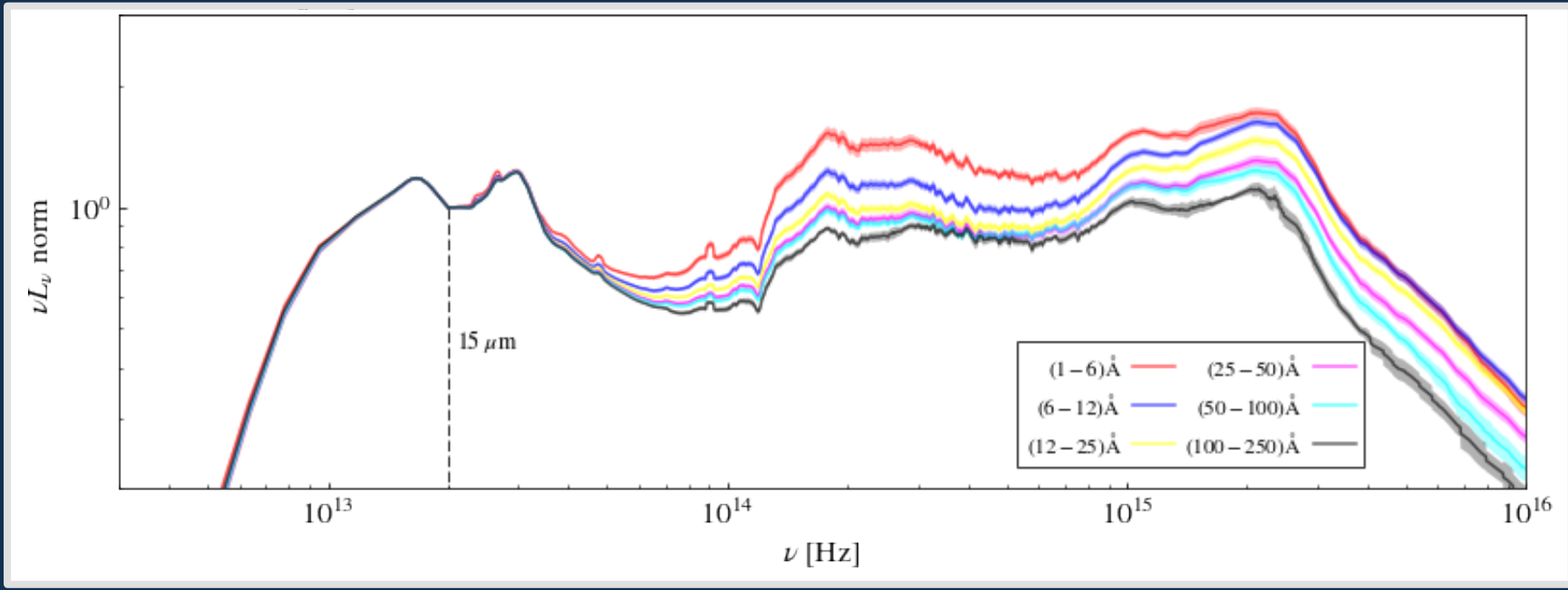
SED fitting with *AGNfitter*
Calistro-Rivera et al.(2016)

Torus templates from CLUMPY library (>10^6 templates)
Nenkova et al. (2008)
Nikutta et al. (2009)

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

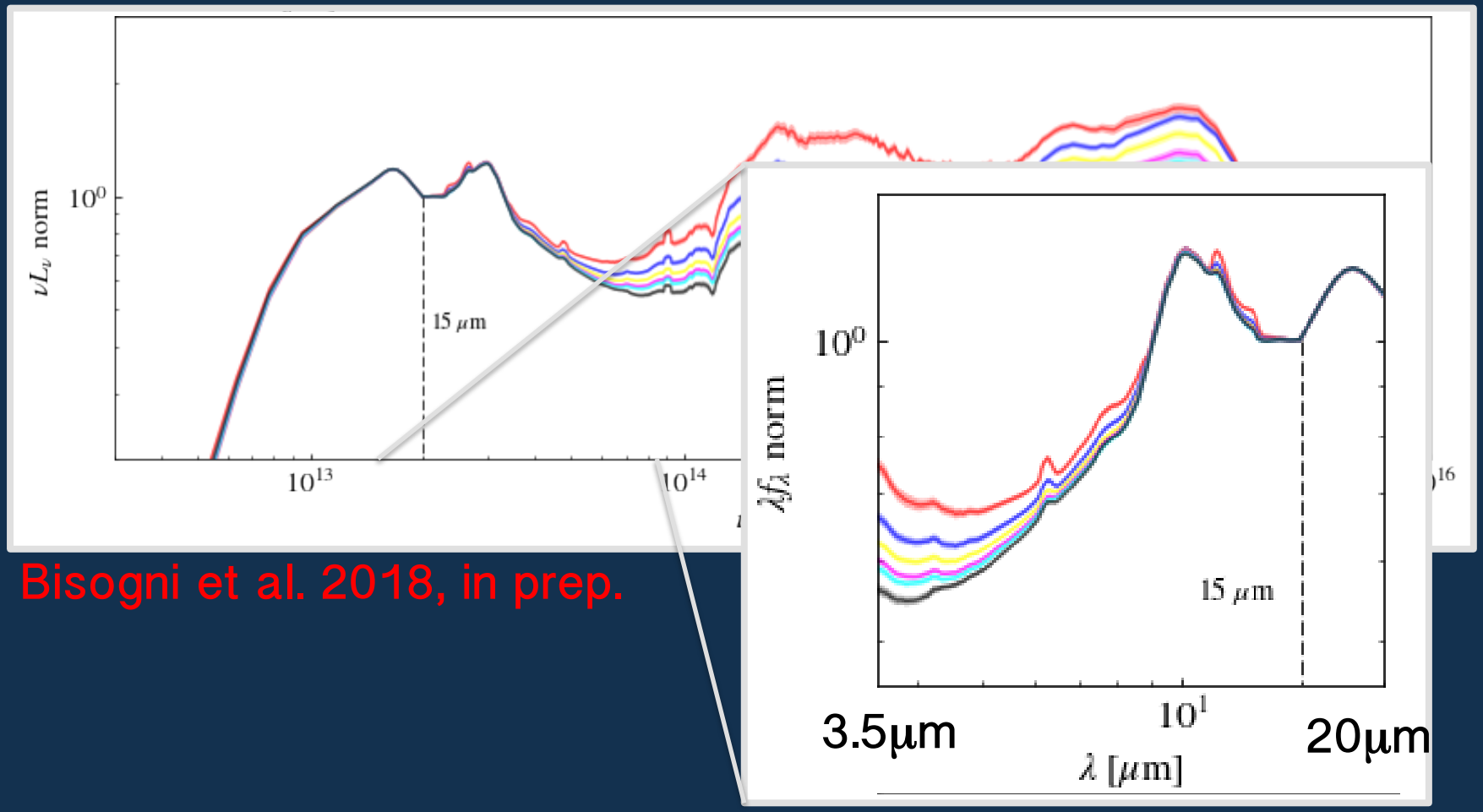


Results



Bisogni et al. 2018, in prep.

Results



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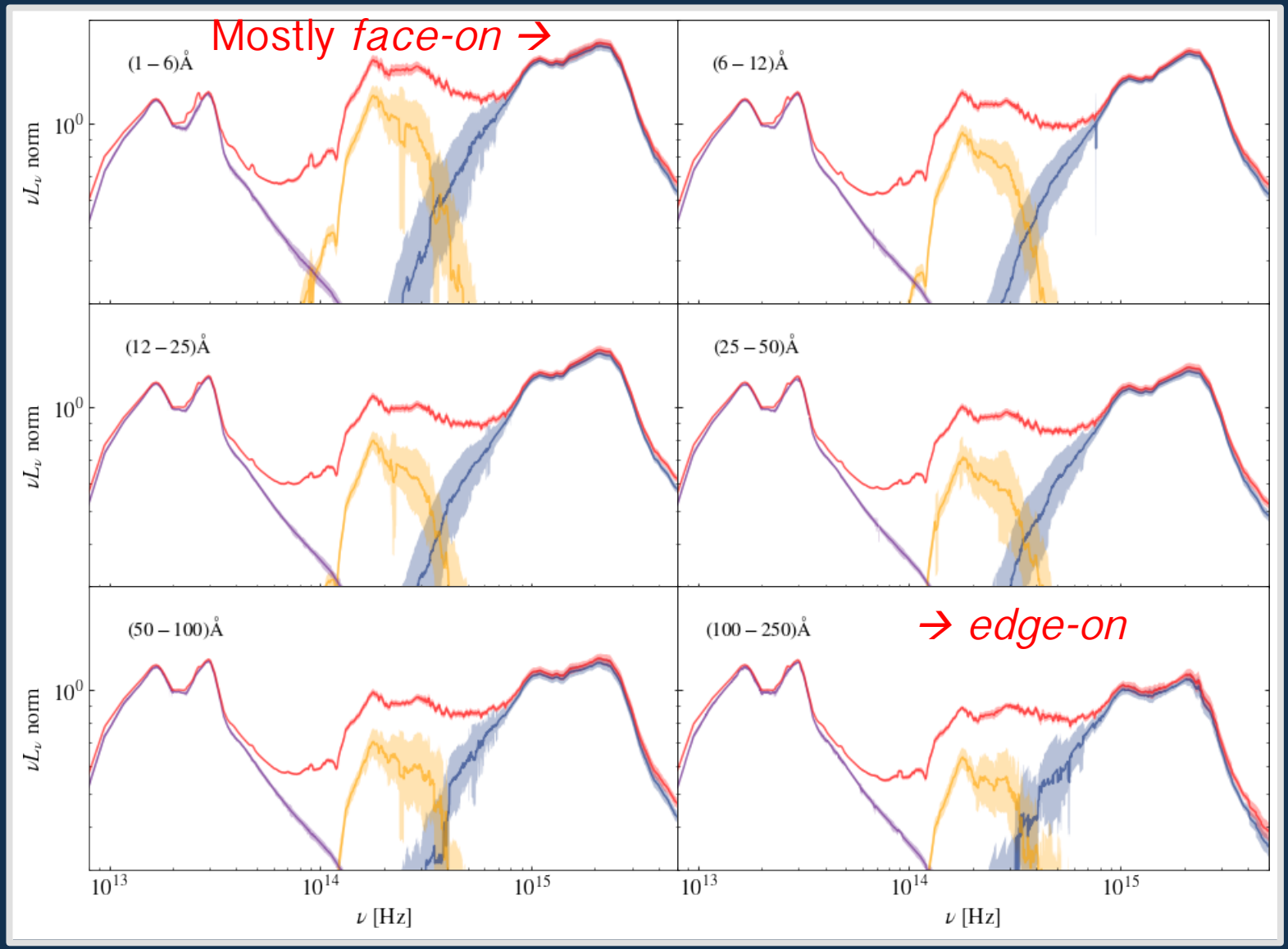
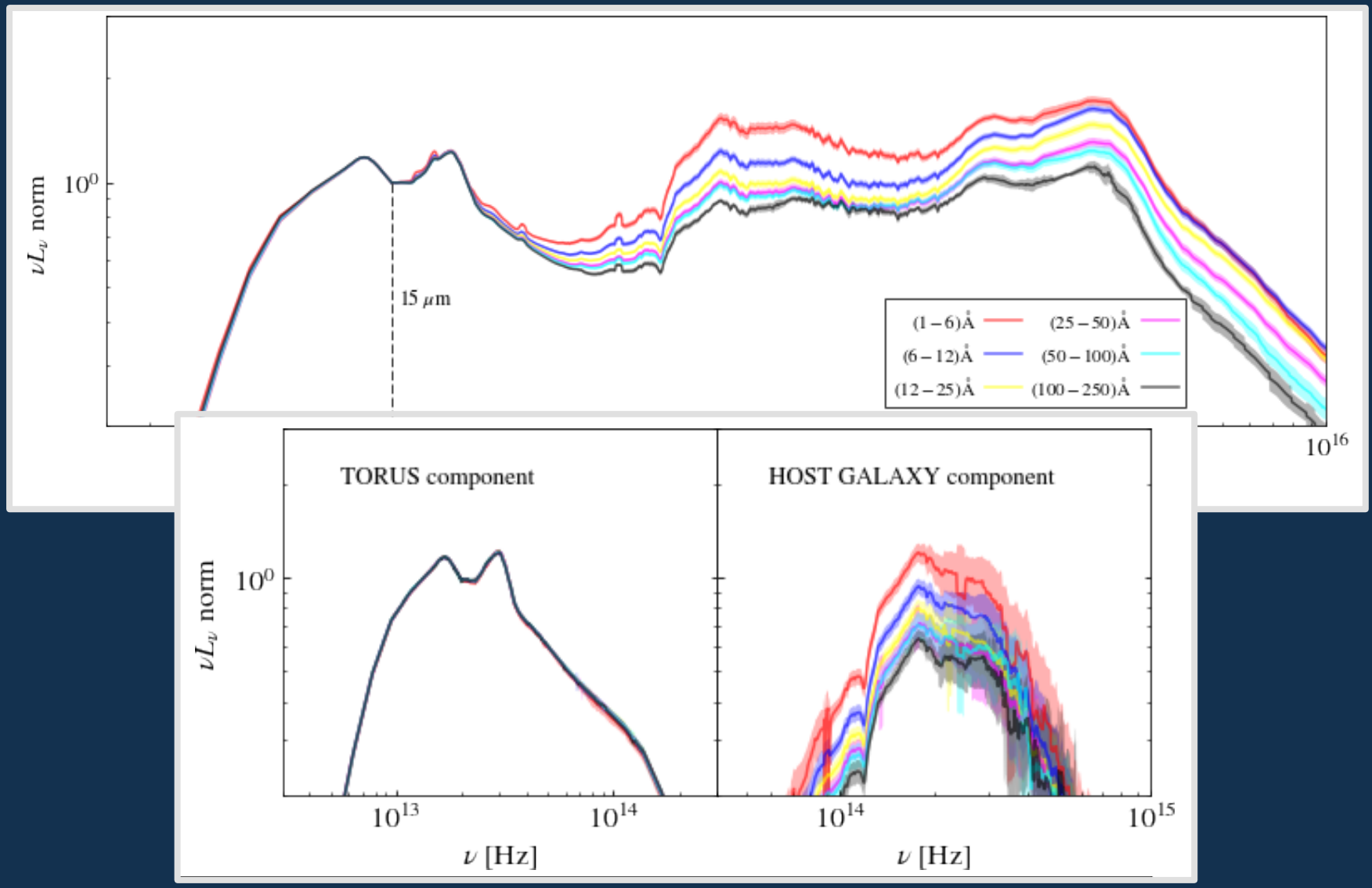
Results


Mostly face-on →
(1 – 6)Å
(6 – 12)Å
(12 – 25)Å
(25 – 50)Å
(50 – 100)Å
(100 – 250)Å
→ edge-on
νL_ν norm
10^0
10^{13}
10^{14}
10^{15}
ν [Hz]

Results

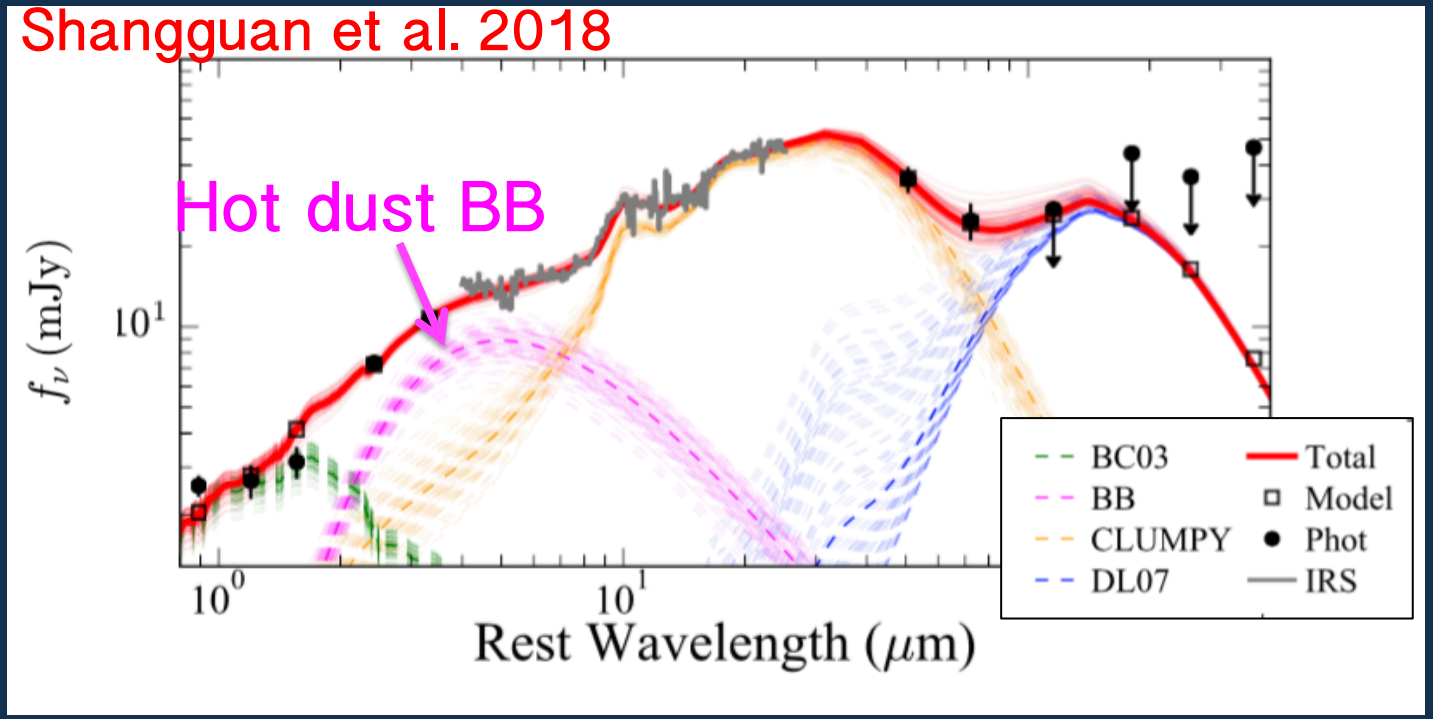

νL_ν norm
10^0
15 μm
10^{16}
(1 – 6)Å
(6 – 12)Å
(12 – 25)Å
(25 – 50)Å
(50 – 100)Å
(100 – 250)Å
TORUS component
HOST GALAXY component
10^{13}
10^{14}
10^{15}
ν [Hz]

A missing component?

Hot dust Black Body T~1000-1900 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

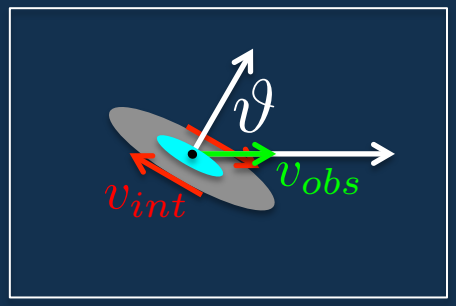


Conclusions

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



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

→ 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