An X-ray/radio sample of AGN

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OUTLINE

- Basic physics of AGN
- Data and Results
- Conclusions and Outlook

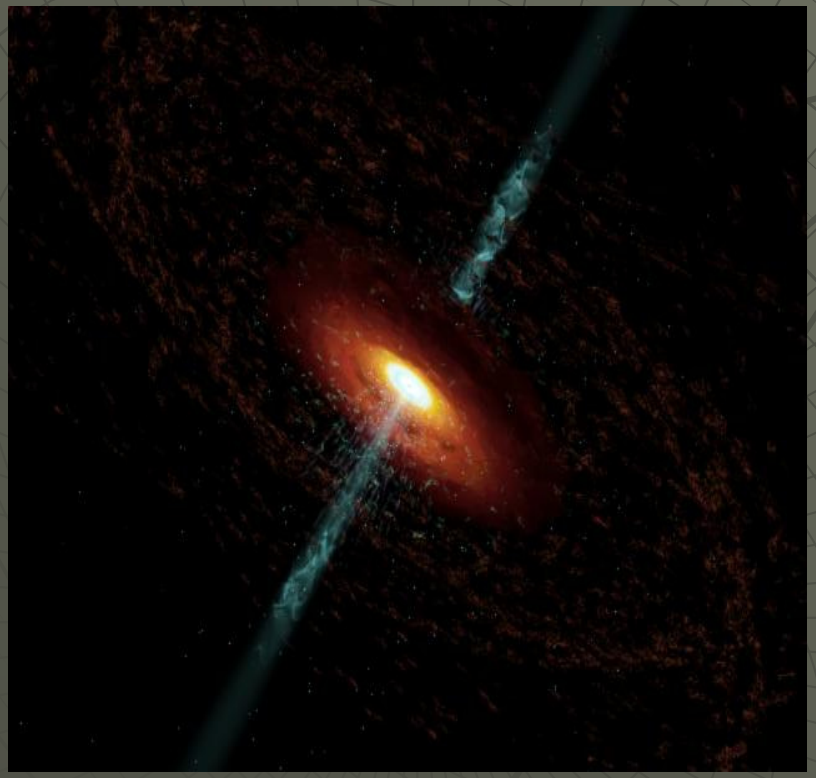
1. The term AGN refers to:

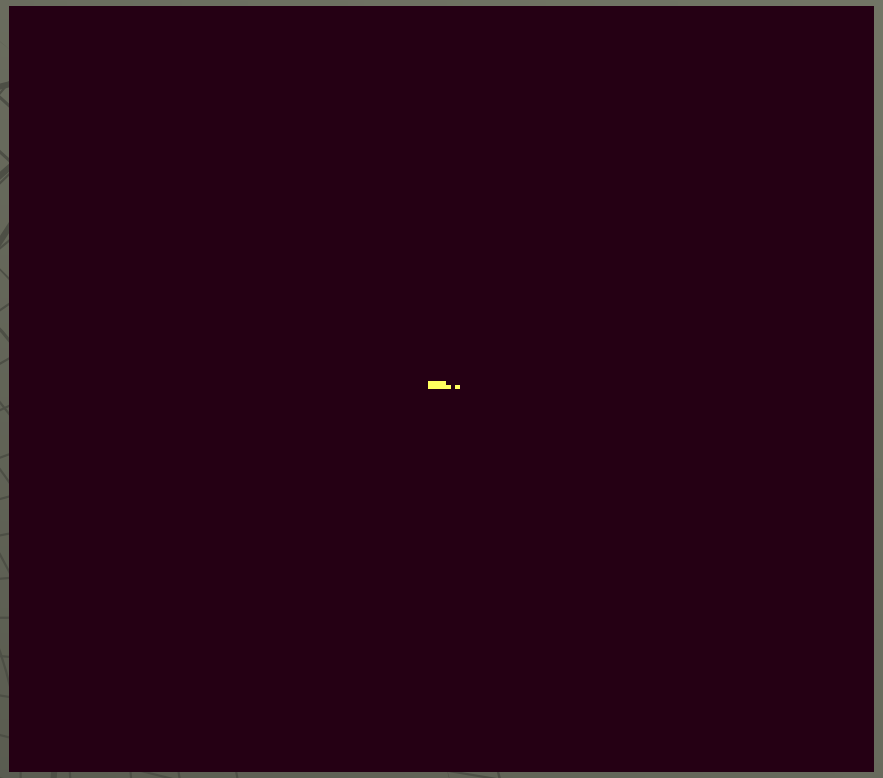
- *Extreme luminosities* (L~10^{42} – 10^{46} erg s^{-1}) not produced by stars

  - Luminosity comes from a very compact region (nucleus) → implies the presence of *SMBH*

  - The main and more efficient mechanism to produce energy is accretion → *ACCRETION DISK*

2. Scheme and parts of an AGN:

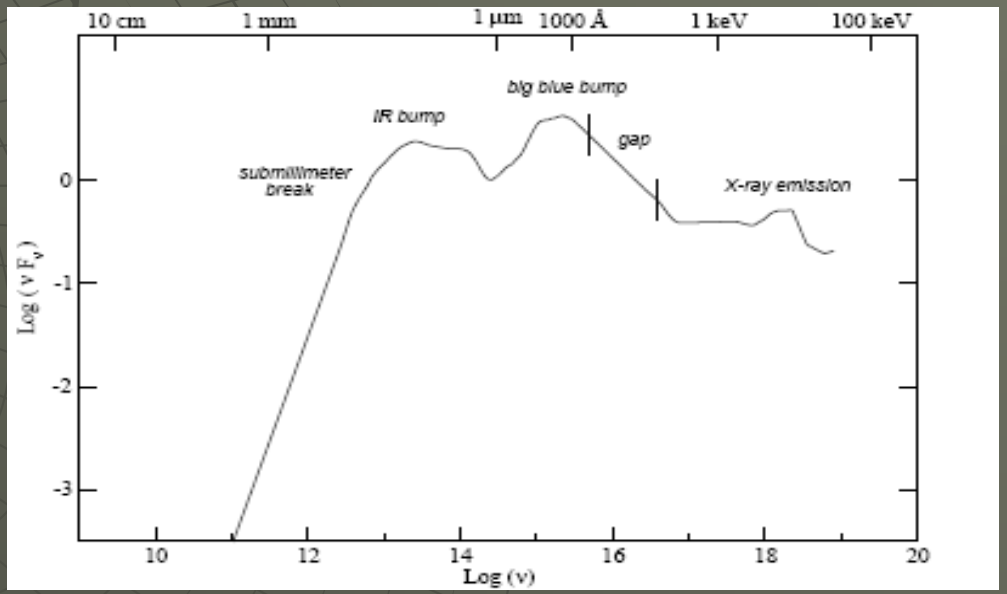




3. AGN emissions:

- Optical/UV band: "big blue bump"→ Accretion Disk
- IR band: thermal emission → Dust (torus)
- Radio → Jet
- X-ray → Comptonization of disk photons
  - Soft: 0.5-2keV
  - Hard: 2-10keV

➢ **Emission in all bands**



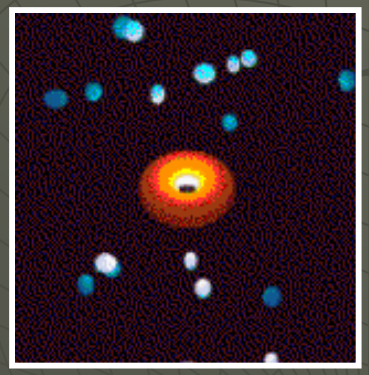
4. Classification of AGN

- radio loud (powerful jets):
  - e.g: radio galaxies, quasars, blazars…
- radio quiet
  - radio quiet quasars (RQQs)
    - $M_{ABS} < -23$ (Veron '06)
  - Seyfert
    - $M_{ABS} > -23$ (Veron '06)

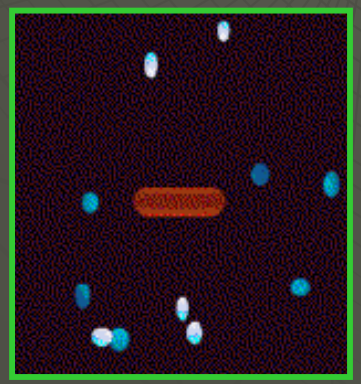
5. Unification Model

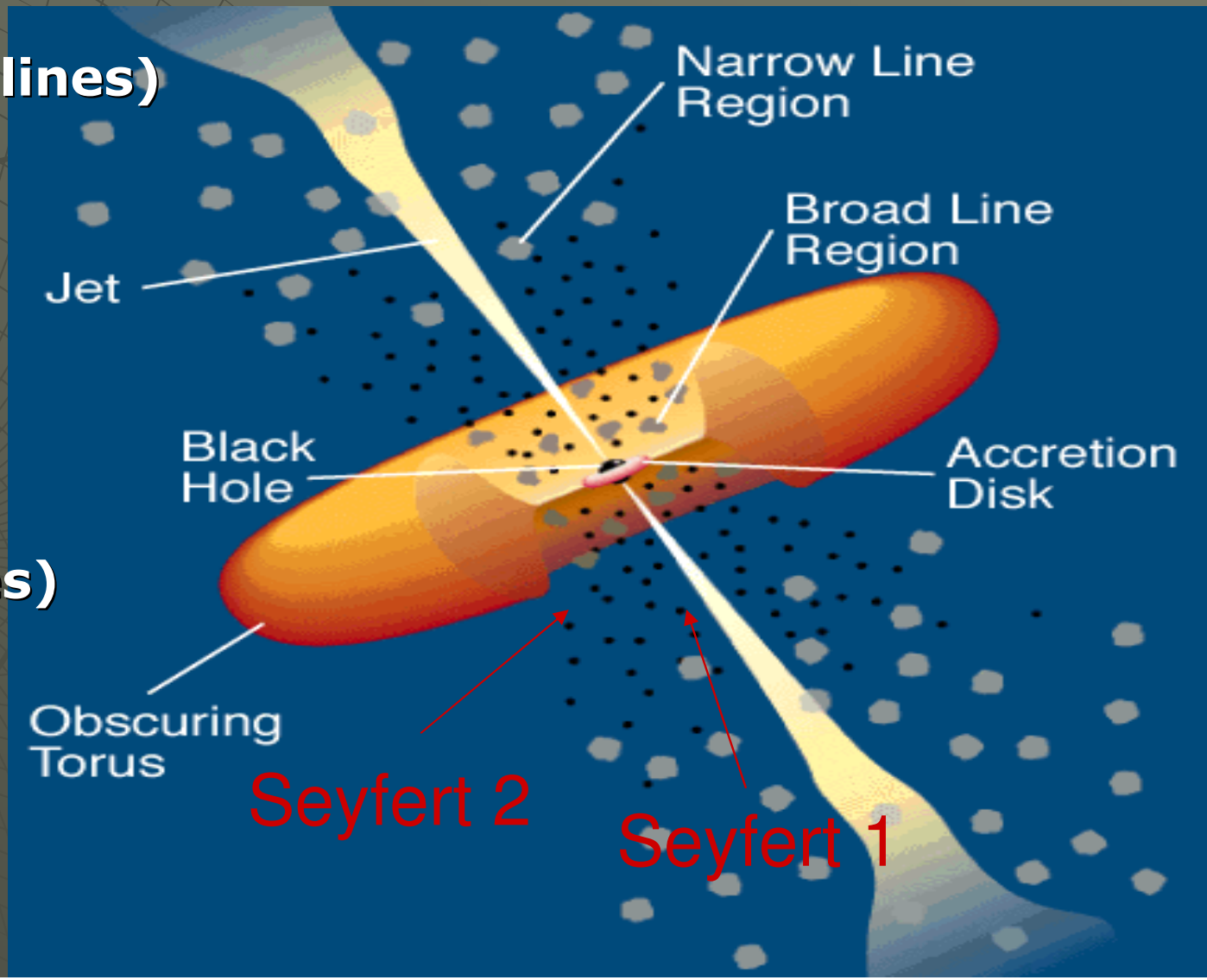
- Geometrical effects are important:

➢ **Seyfert 1s**
(Narrow and broad lines)



➢ **Seyfert 2s**
(Only narrow lines)





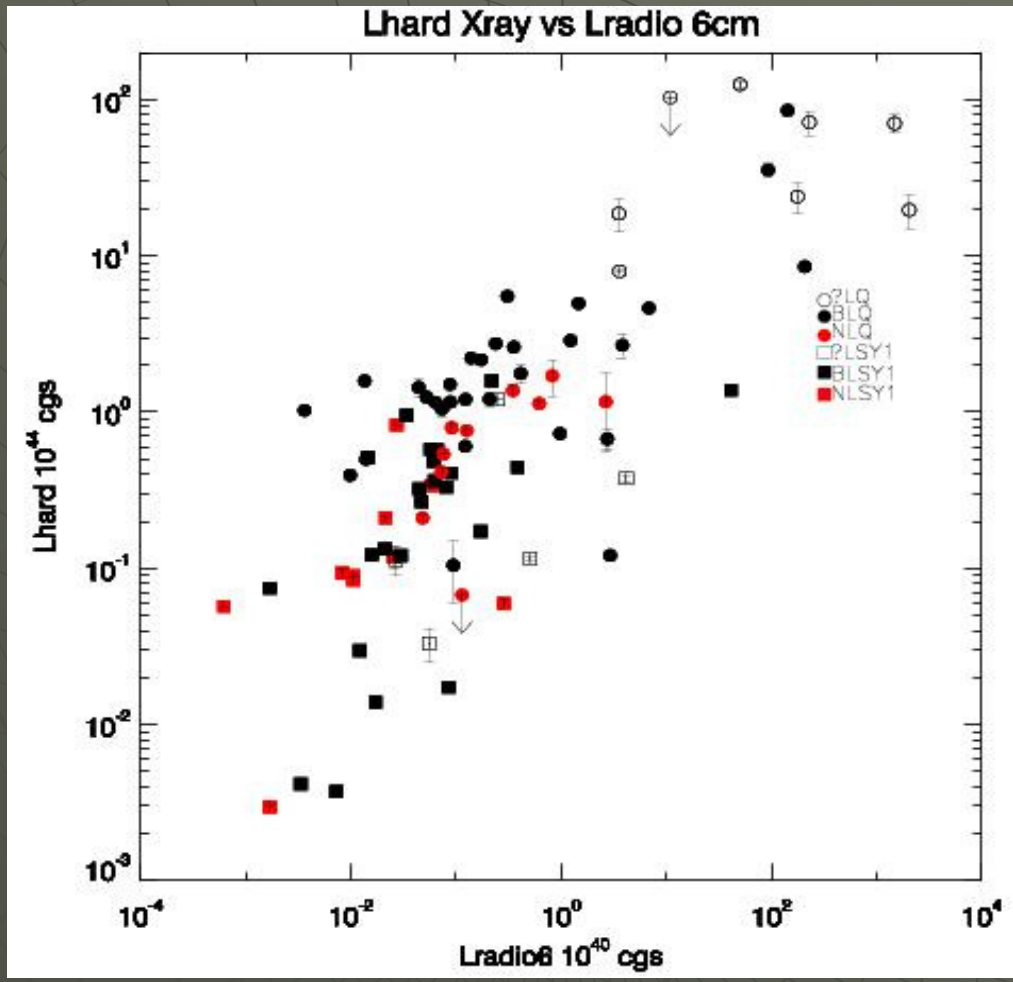
6. Advantages of a multiwavelength analysis

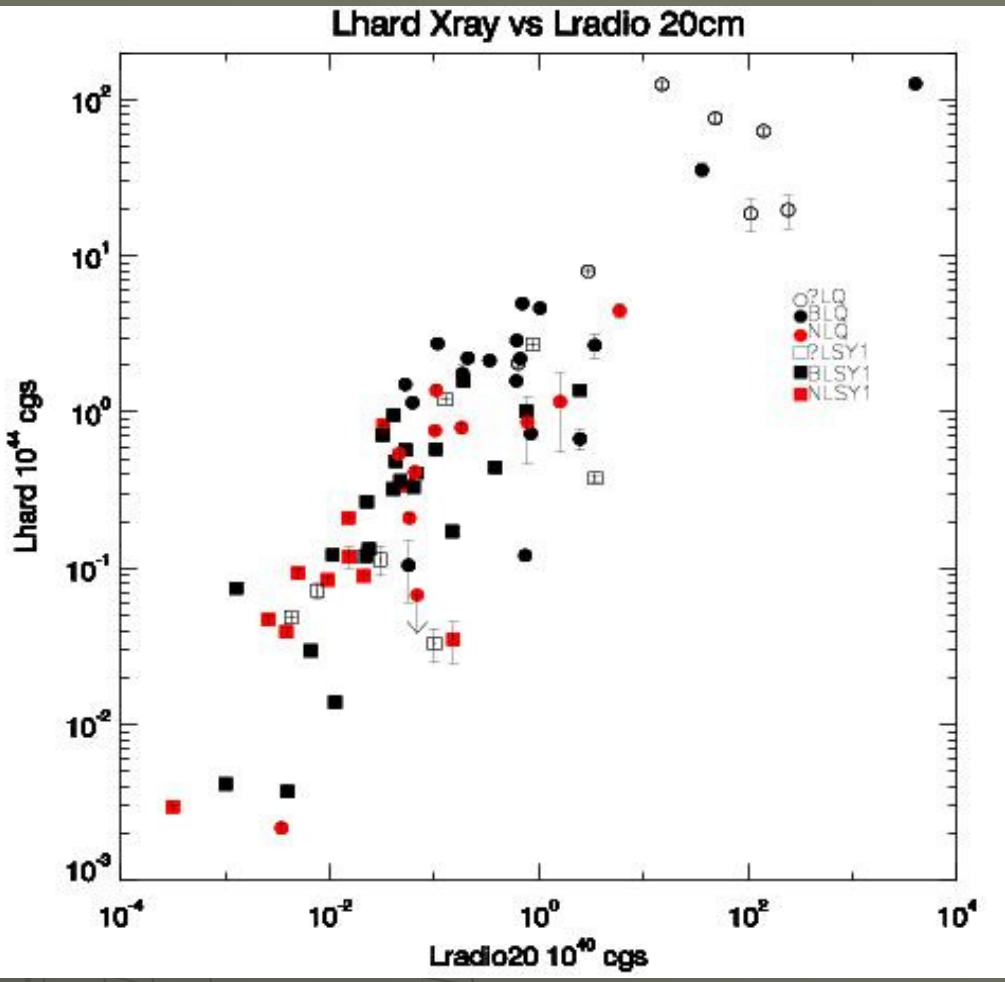
- Each component has a different origin
- Better knowledge of the properties of an AGN
- Main goal of this project: DATA CORRELATION
  - X-ray data (XMM Newton)
  - Radio and optical data (catalogues)
    - Vizier: http://vizier.u-strasbg.fr/viz-bin/VizieR
    - NED: http://nedwww.ipac.caltech.edu/
    - ADS: http://adswww.harvard.edu/
    - SIMBAD: http://simbad.u-strasbg.fr/

7. Results: the AGN catalogue

- X-ray:
  - 130 Type 1 AGN targeted by XMM-Newton
  - Luminosities in both bands: hard & soft
  - Main spectral properties (iron line, spectral index…)
- Optical:
  - M_{ABS} to distinguish between quasars and Seyfert
  - BH masses
  - Hβ FWHM to reclassify sources:
    - Narrow line < 2000km/s
    - Broad line > 2000km/s
- Radio:
  - Flux in 6cm (5GHz) and 20cm (1.4GHz)

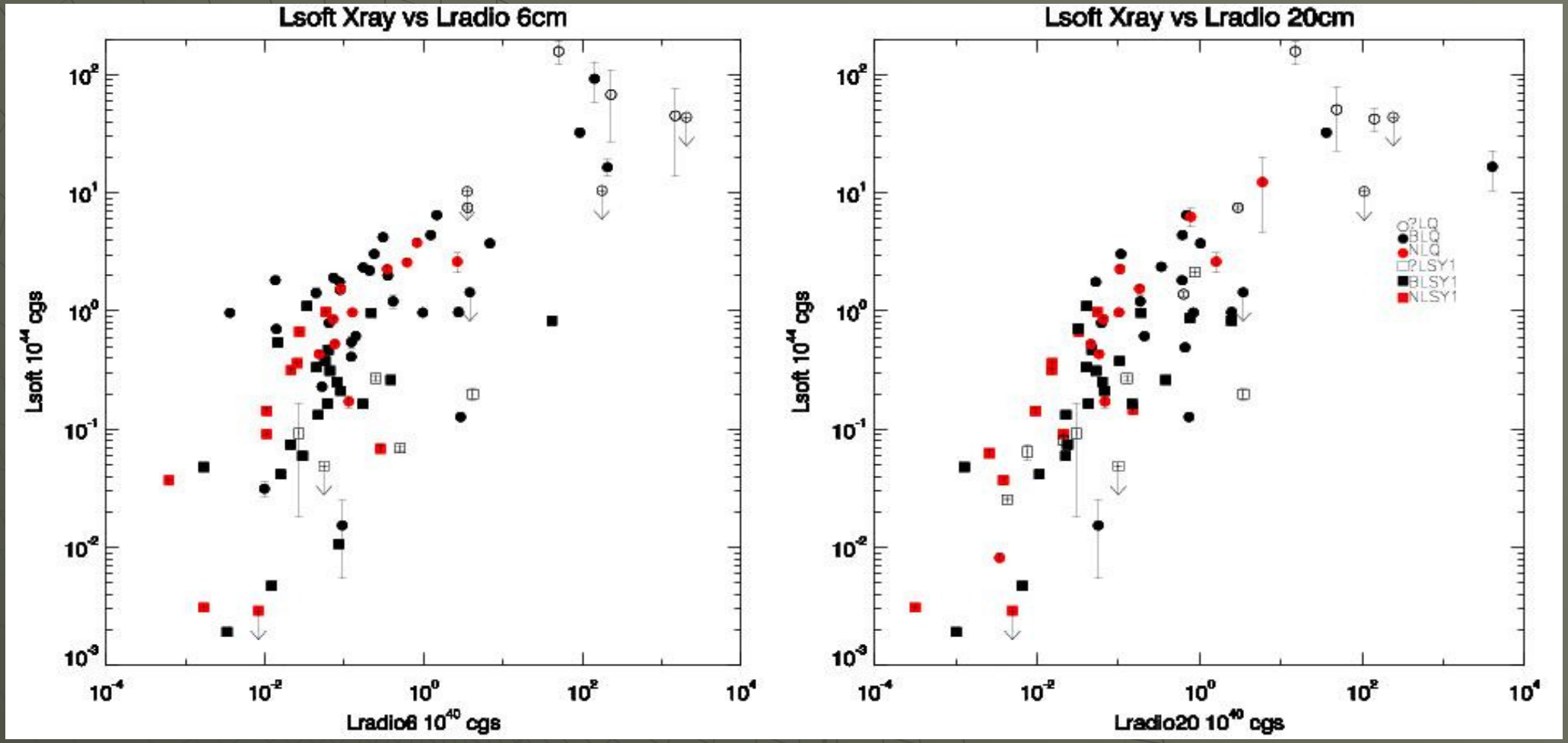
8. Final results: HIGH ENERGY band [2-10keV]





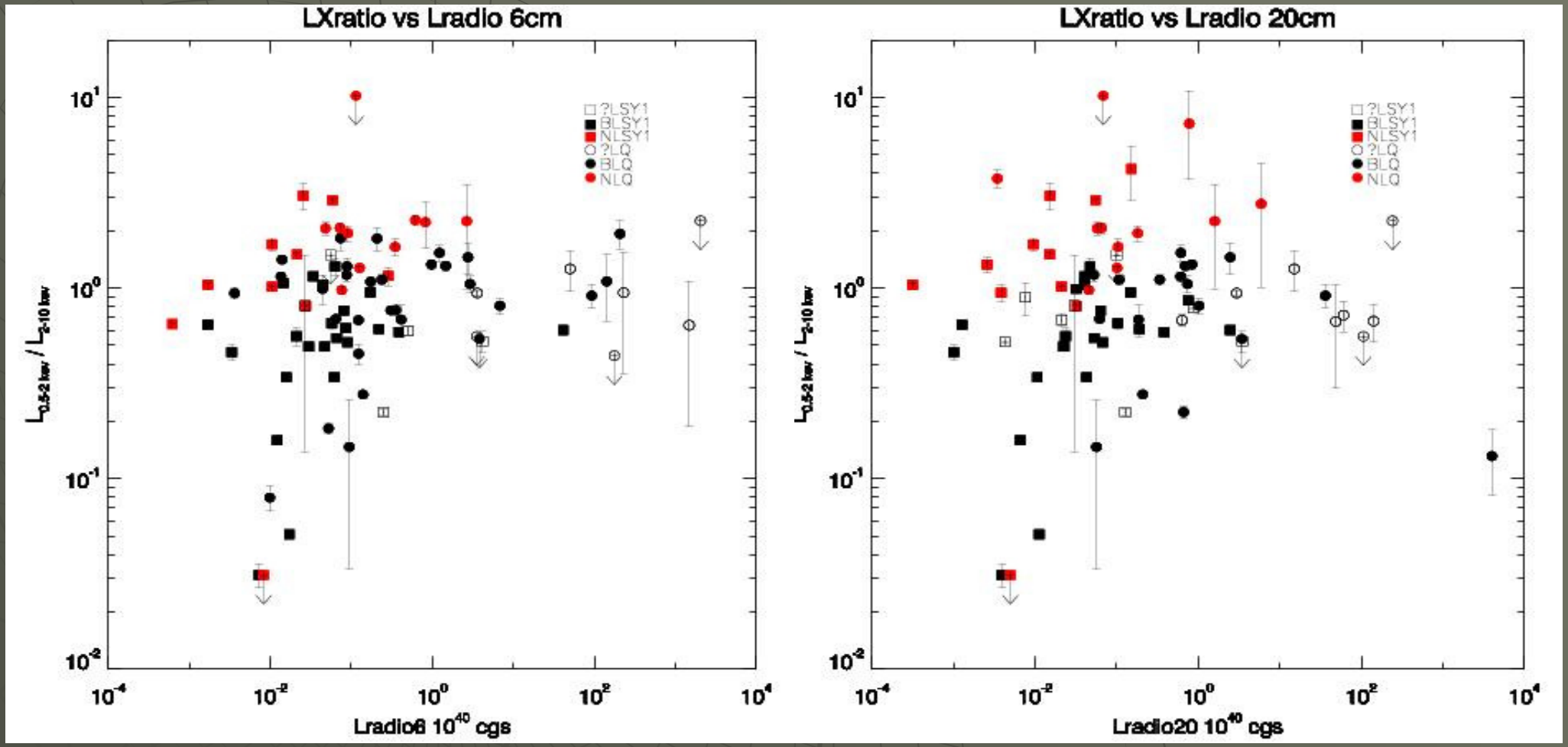
→ GOOD CORRELATION: no differences between classes

8. Final results: LOW ENERGY band [0.5-2keV]



→ GOOD CORRELATION: no differences between classes

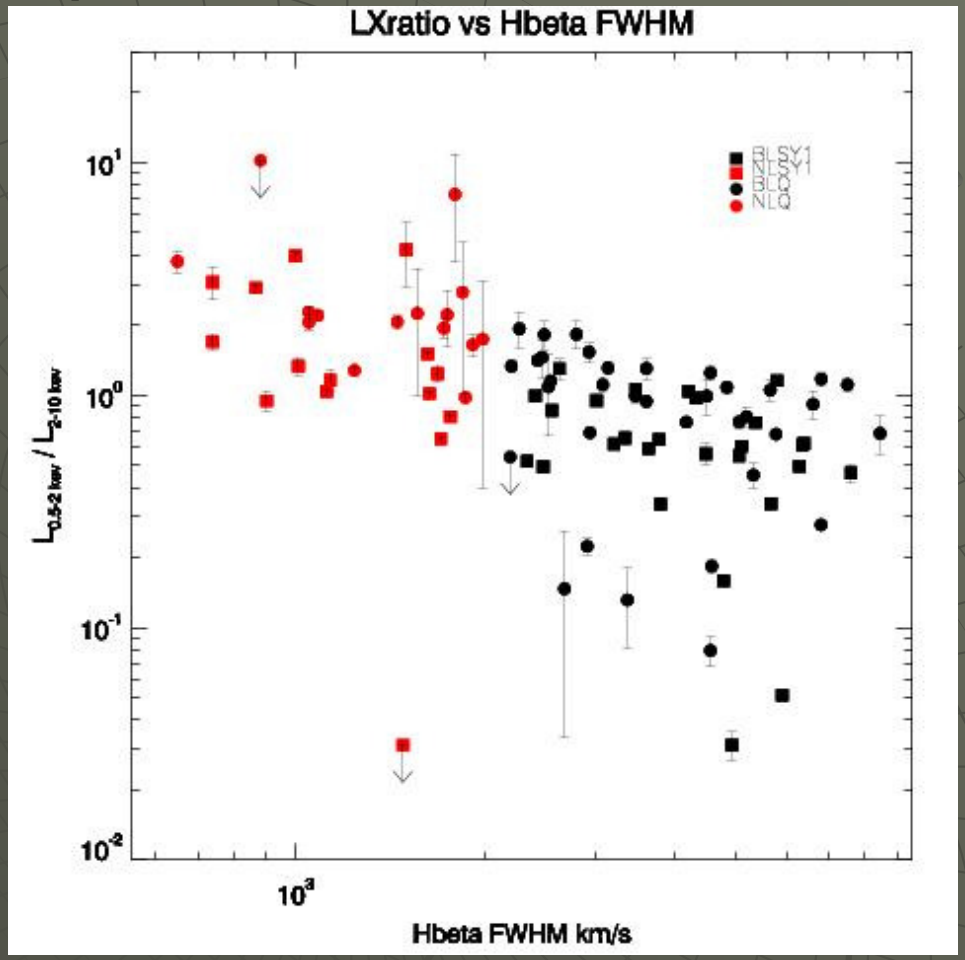
8. Final results: ratio SOFT/HIGH bands



→ NLSY (red): higher soft excess than other sources

→ No evidence of correlation with radio data

8. Final results: ratio SOFT/HIGH bands and Hβ FWHM



→ Large X-ray ratio for sources with narrower Hβ FWHM:

CORRELATION!!!

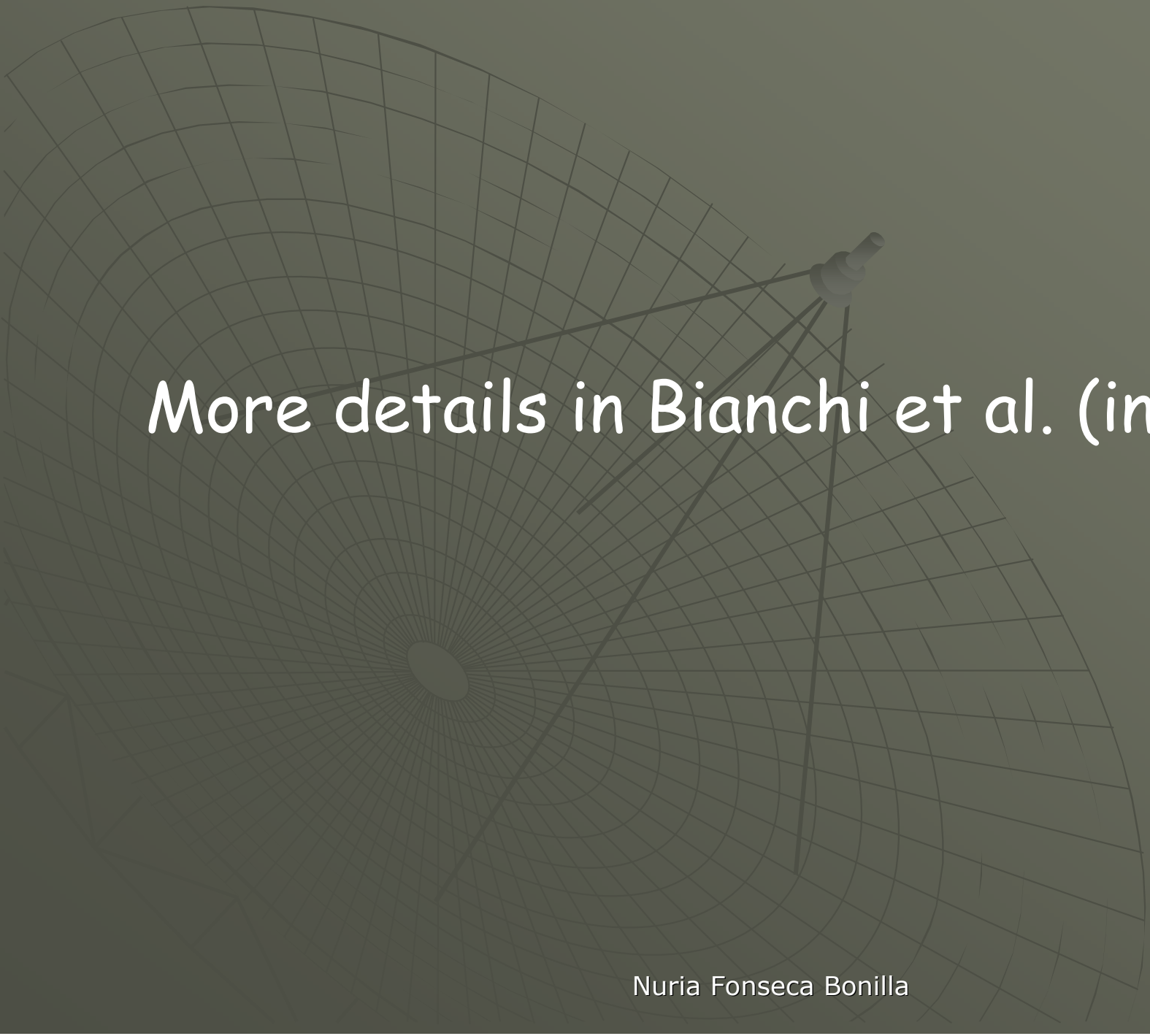
$$v \downarrow \Rightarrow \begin{cases} FWHM \downarrow \Rightarrow r_{BLR} \uparrow \\ BHmass \downarrow \Rightarrow \text{good AD models} \end{cases}$$

9. Further analysis

- Tests in other bands
- Studies with other parameters and correlations

10. Conclusions

- Search in catalogues for data:
  - M_{ABS} to separate quasars and Seyfert
  - Radio fluxes looking for correlations
  - Hβ FWHM to reclassify in NL and BL
- Results:
  - Good correlation between X-ray/radio
    - Both emissions related to main parameters of AGNs (mass, accretion rate…)
    - Not depends on the class
  - Large soft excess in NLSY
  - Correlation between X-ray ratio and Hβ FWHM



More details in Bianchi et al. (in prep.)