



NYU ABU DHABI

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CNOC IX
OAR-Roma
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- LMXBs
- Open questions
- Previous studies
- Our results
- Conclusions

NS or BH primary, accreting from
a low mass companion ($M < M_{\odot}$)

Transient LMXBs

Outburst

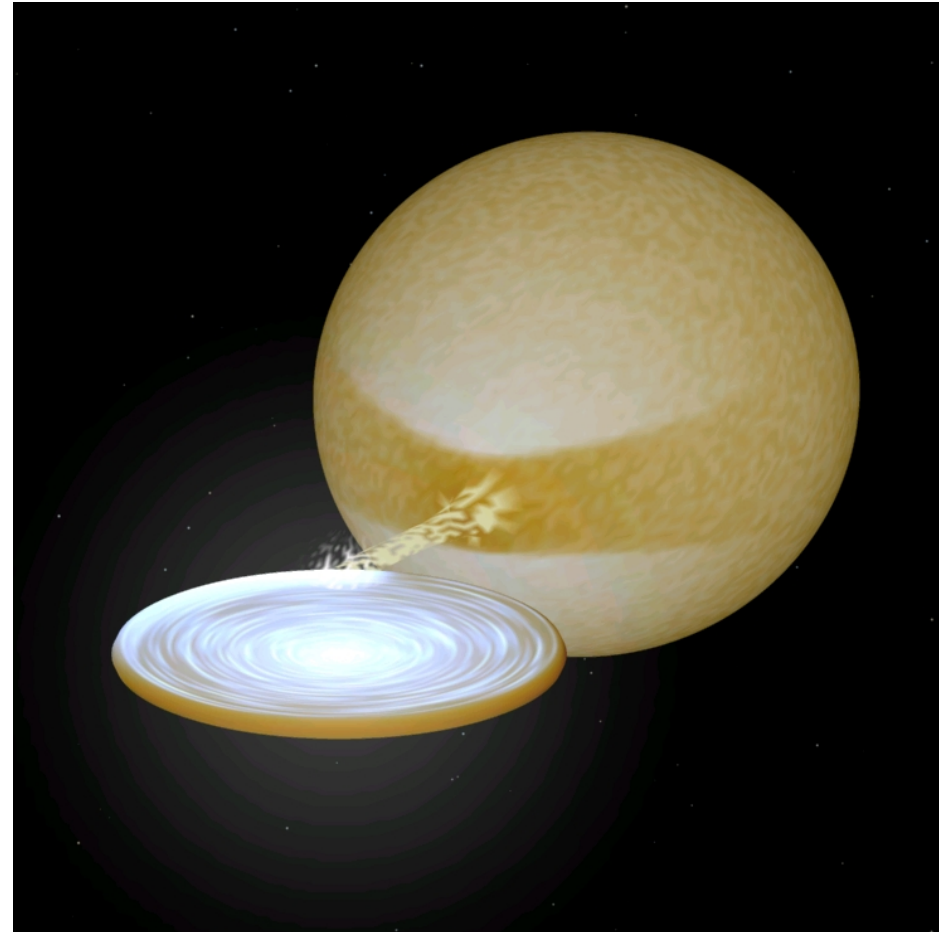
Lasting weeks to years

$$L_X \approx 0.1 L_{\text{Edd}}$$

Quiescence

Lasting up to decades

$$L_X \approx 10^{-8} - 10^{-4} L_{\text{Edd}}$$

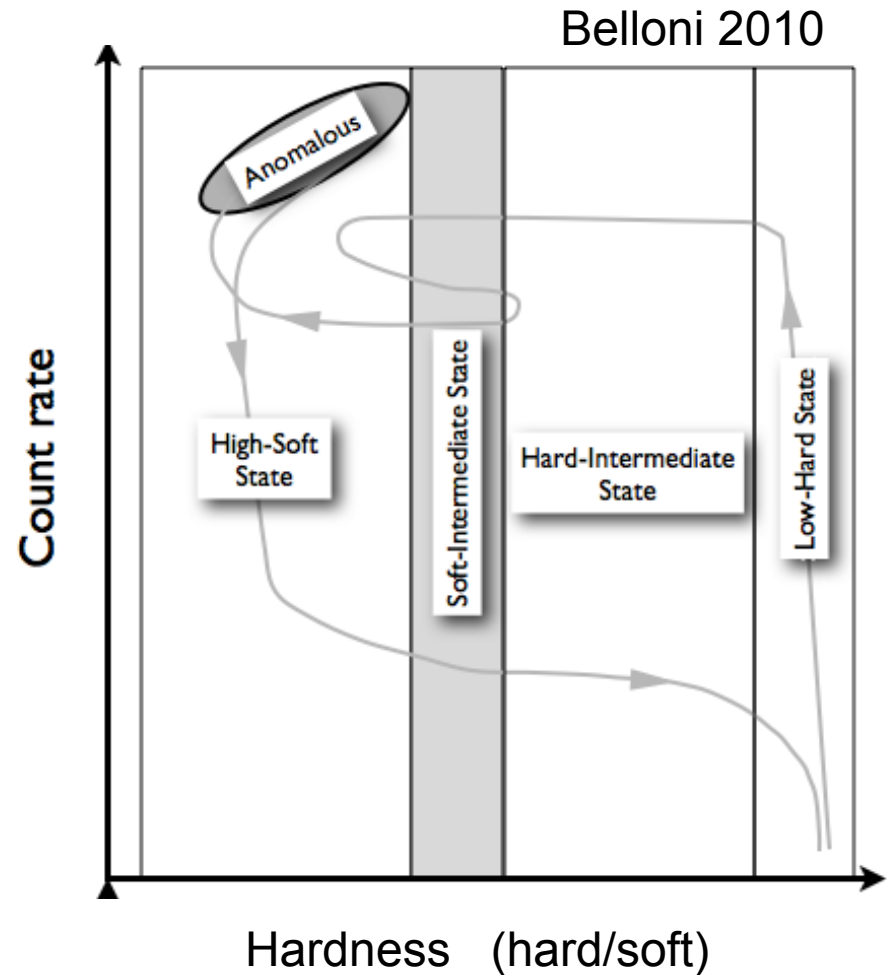


Hard state and quiescence

Outburst hard state and quiescence share similar properties, e.g.

BHXB: Compact Jet detected in both

How similar are they?



- **Optical, IR, and UV several competing emission mechanisms: Jet, X-ray reprocessing, Intrinsic emission from the disk**

What is the dominating emission process at different wavelengths?

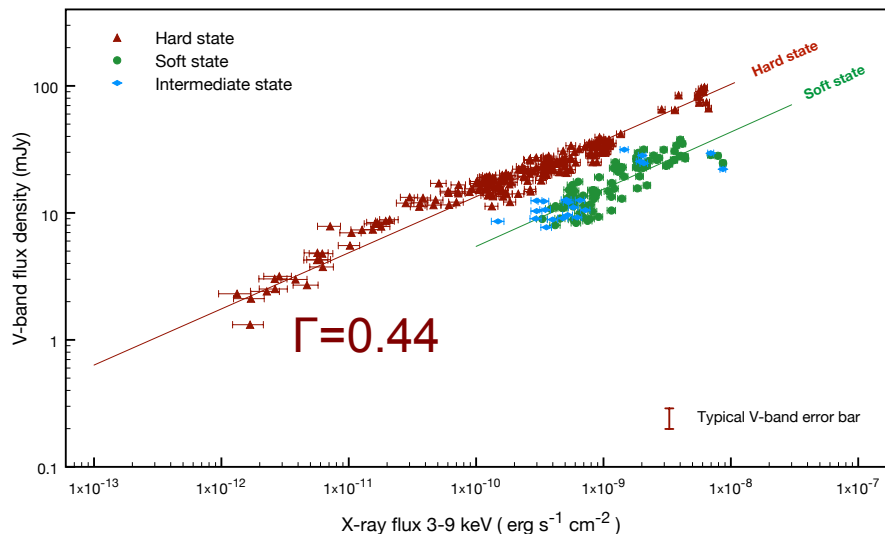
- **Excess emission in the optical, IR and UV respect to the companion star.**

What is producing this excess and where in the binary system does it come from?

Changes in the emission properties at long wavelengths (radio, OIR, UV) linked to spectral changes in the X-ray

Correlation studies can provide insight on the emission process
Slope $\longleftrightarrow$ Emission process

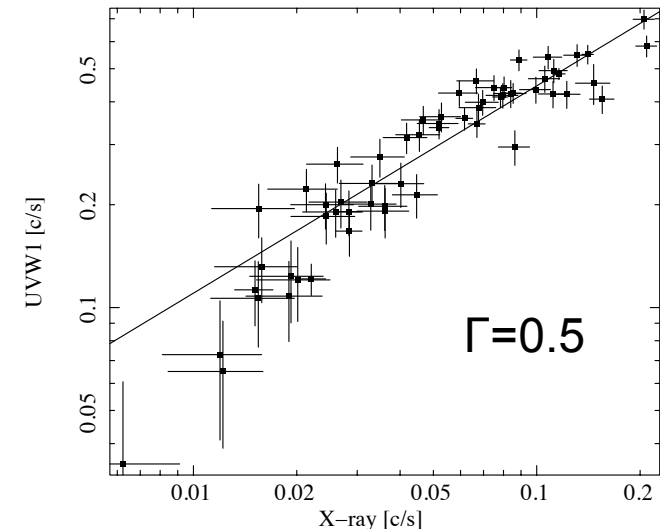
BH GX 339-4 in OUTBURST



9/28/15

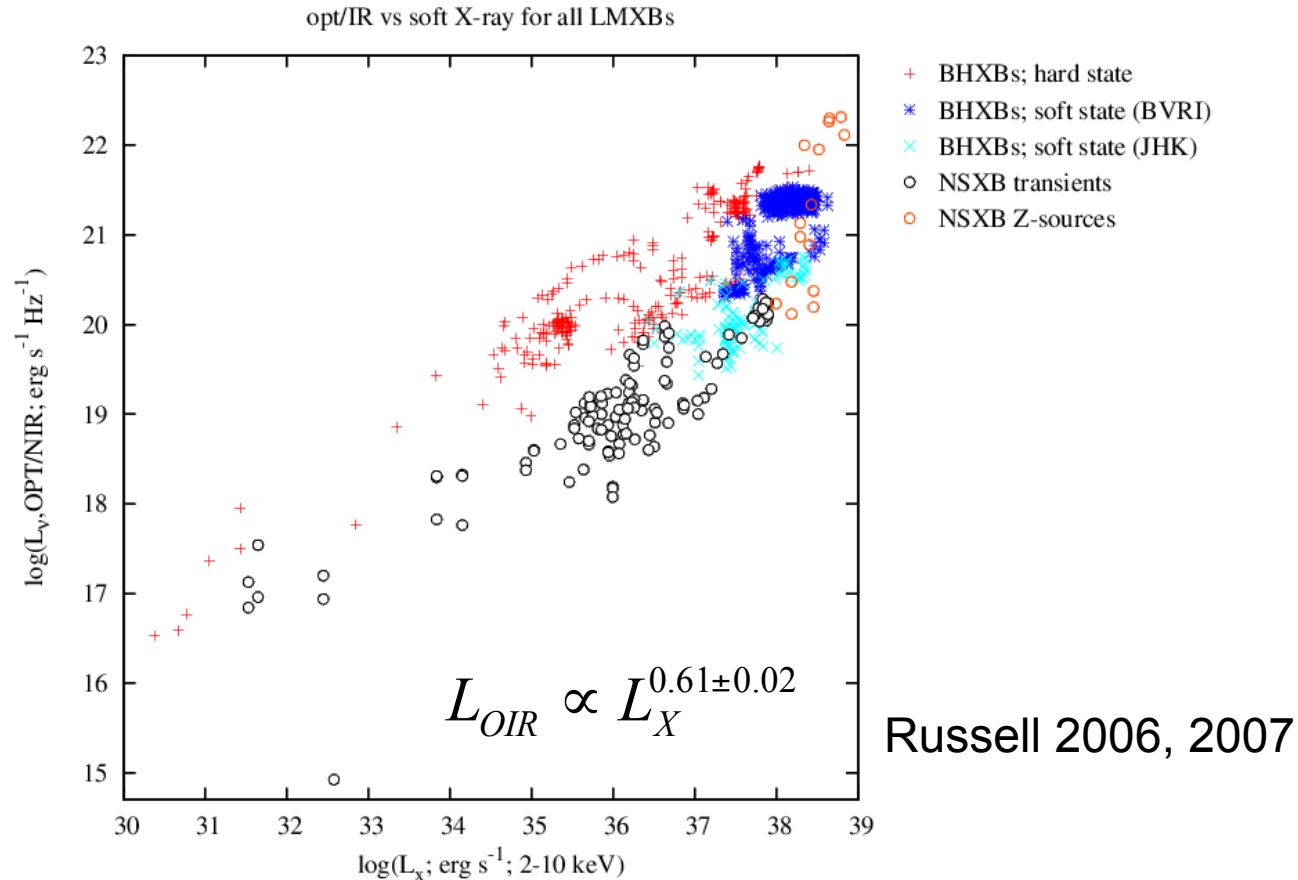
Coriat 2009

NS Cen X-4 in Quiescence



Bernardini 2013

Globally, BH are a factor 20 optically brighter than NS.



- What emission mechanism is producing the correlation?
- Why BH are optically brighter than NS at a given X-ray luminosity?

A study from outburst to quiescence of a single object is missing

We compare for the first time a BH and **NS** from outburst to quiescence

BH – V404 Cyg

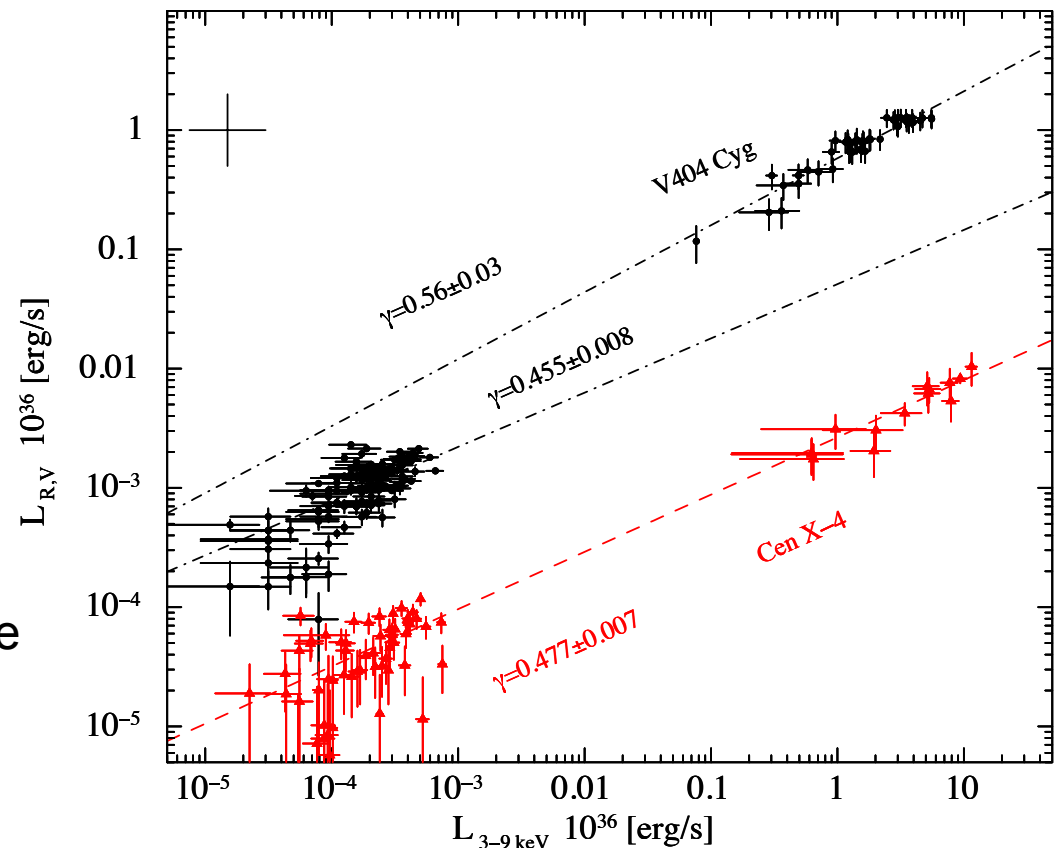
NS – Cen X-4

Strong Correlation

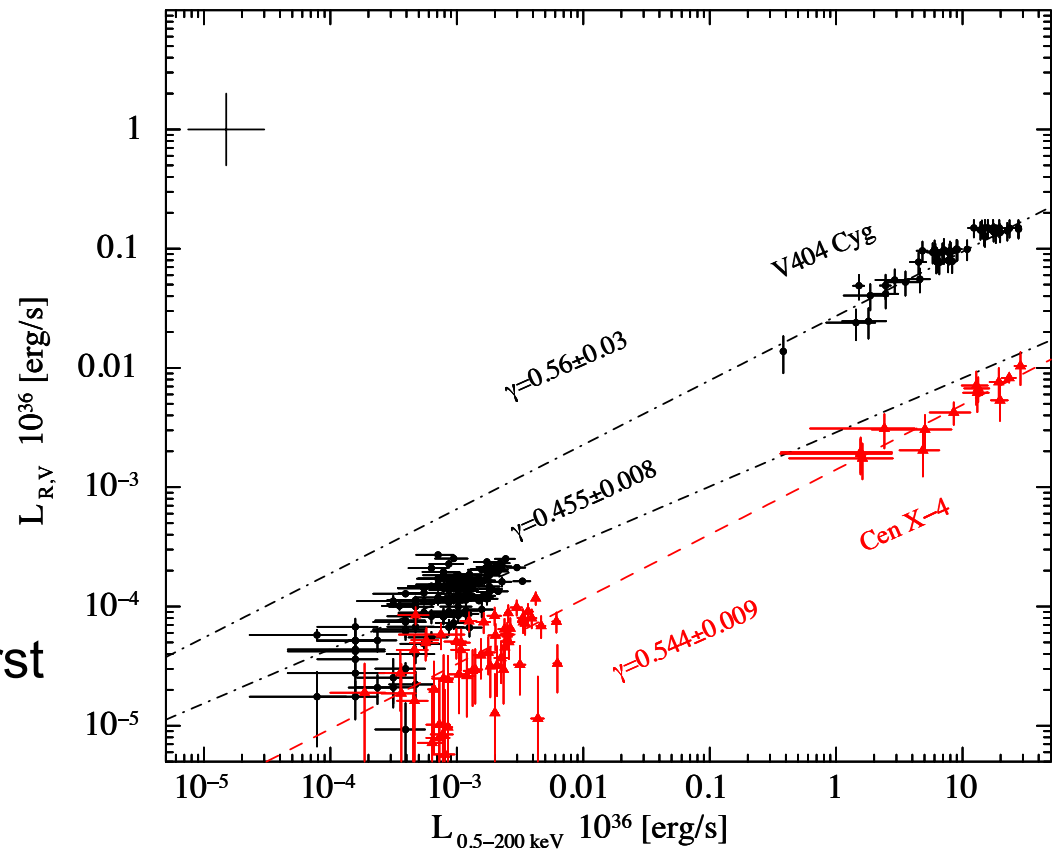
Break in BH correlation

BH x300 opt. brighter in outburst

BH x25 opt. brighter in quiescence



1. We account for the bolometric X-ray (0.5-200 keV) luminosity
2. We account for the difference in disk size and compact object mass



Consistent in quiescence
BH still x20 brighter in outburst

There must be another mechanism making the BH brighter in outburst

What is this mechanism?

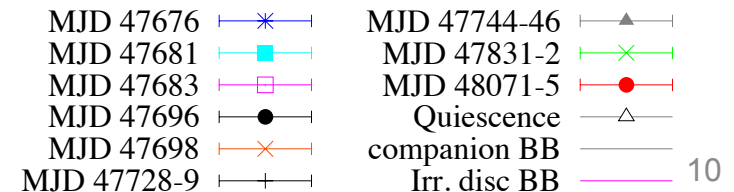
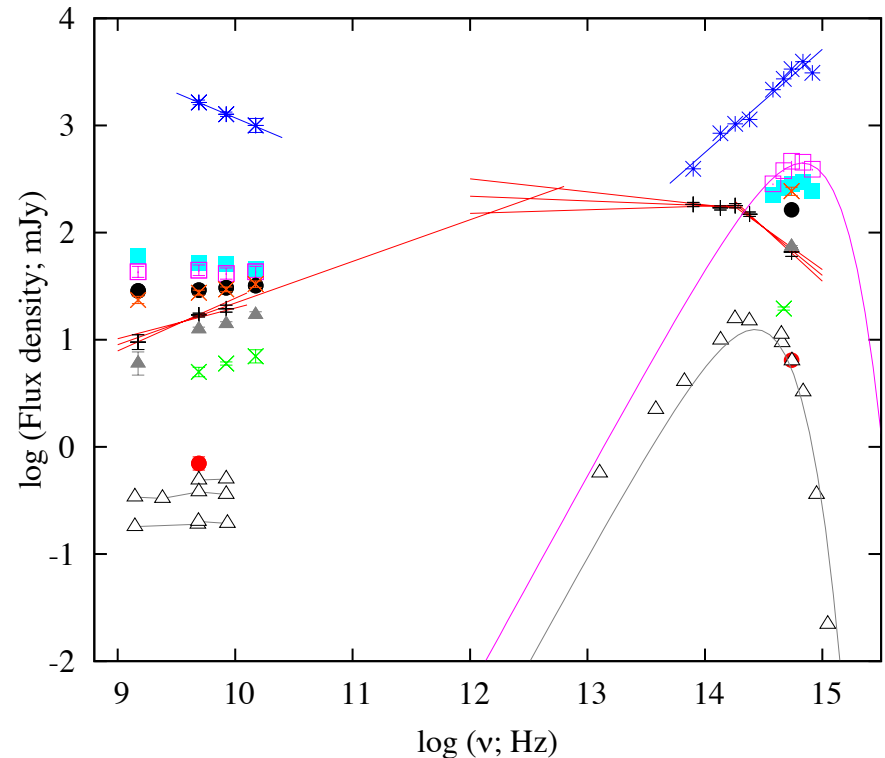
From SED we estimate the Jet contribution in the optical band for the BH

Hard state:

Jet is 90 % of the optical flux

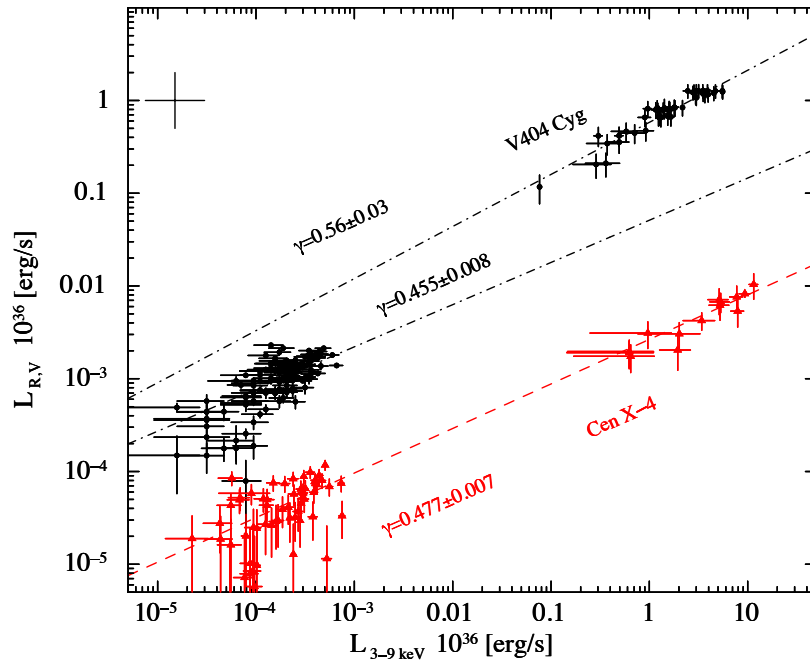
Quiescence:

Jet contribution is marginal

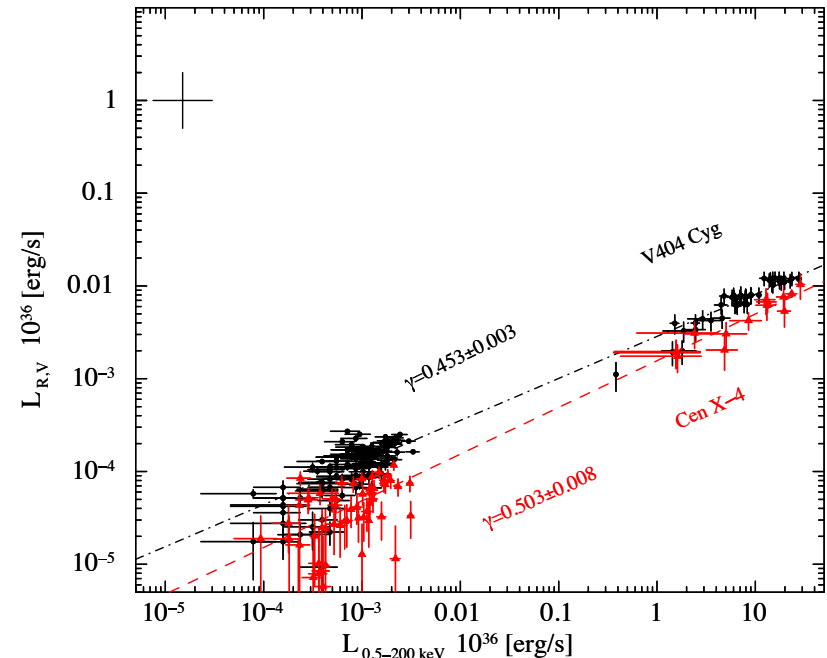


1. We account for the bolometric X-ray (0.5-200 keV) luminosity
2. We account for the dominant jet contribution for the BH in outburst
3. We account for the difference in disk size and compact object mass
4. We account for the emission from the NS surface in quiescence

Before corrections



After corrections



1. If known differences between V404 Cyg and Cen X-4 are taken into account they behave very similarly. The BH V404 Cyg has:

- Larger mass
- Larger accretion disk
- Larger X-ray bolometric emission
- Strong jet contribution in outburst only for the BH system (marginal for the NS)
- Emission from the NS surface in quiescence

2. We likely found the dominant emission process (companion subtracted)

	Outburst	Quiescence
BH	Jet (+ Reprocessing)	Reprocessing
NS	Reprocessing	Reprocessing

Next:
Test this procedure on a larger number of sources (if possible)

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THANKS!