

Black Hole Universe

BLACK HOLE UNIVERSE

UNIVERSITY OF
Southampton



A “NEW” LOOK TO BLACK HOLES IN OUTBURST

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University of Southampton

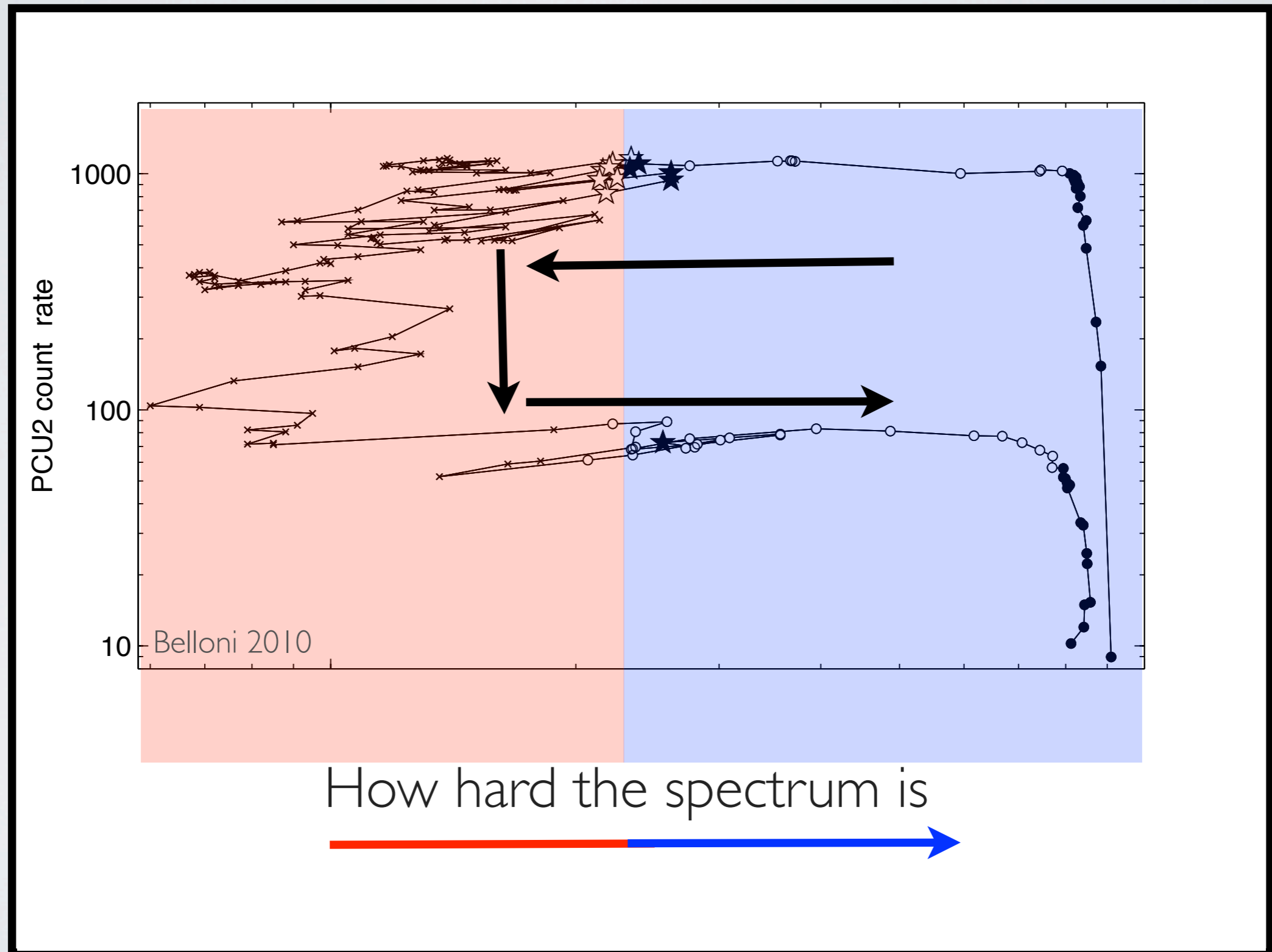
with:

M. Coriat, G. Ponti, R. Fender, D. Plant, R. Dunn

Inclination effects:

how they do affect the Hardness-intensity diagrams

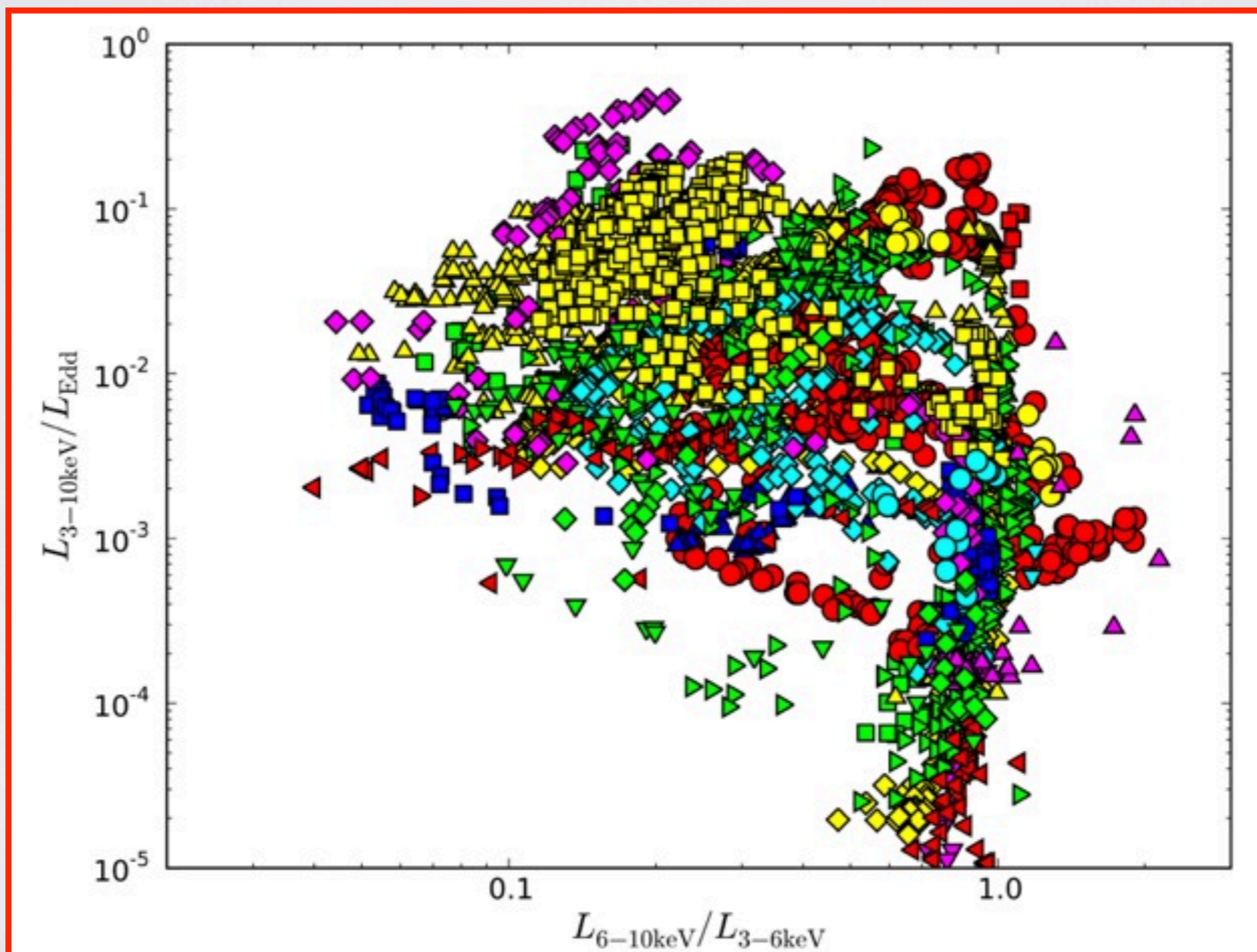
X-ray Luminosity
↑



How hard the spectrum is
→

MANY BLACK HOLES TO LOOK AT

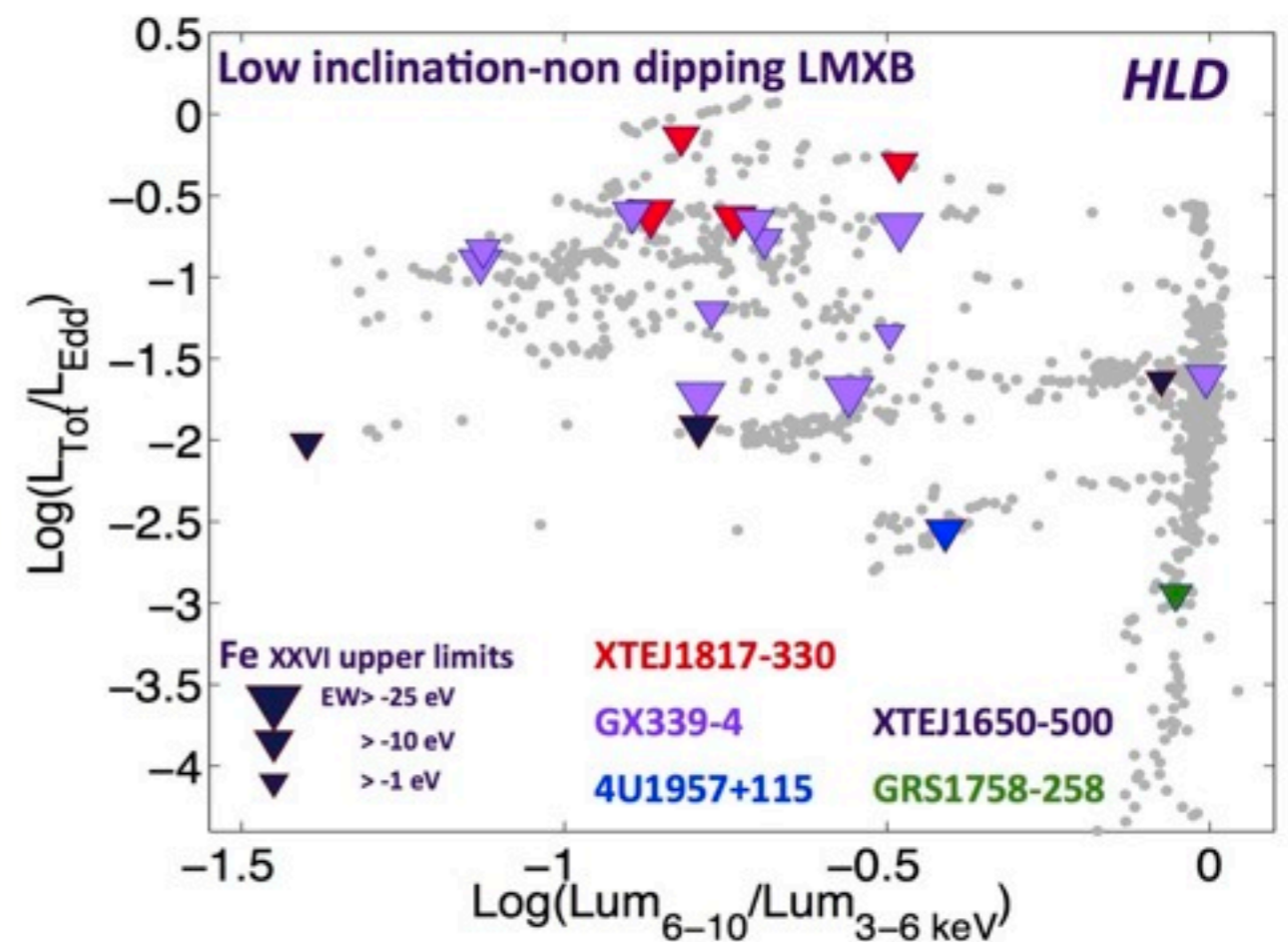
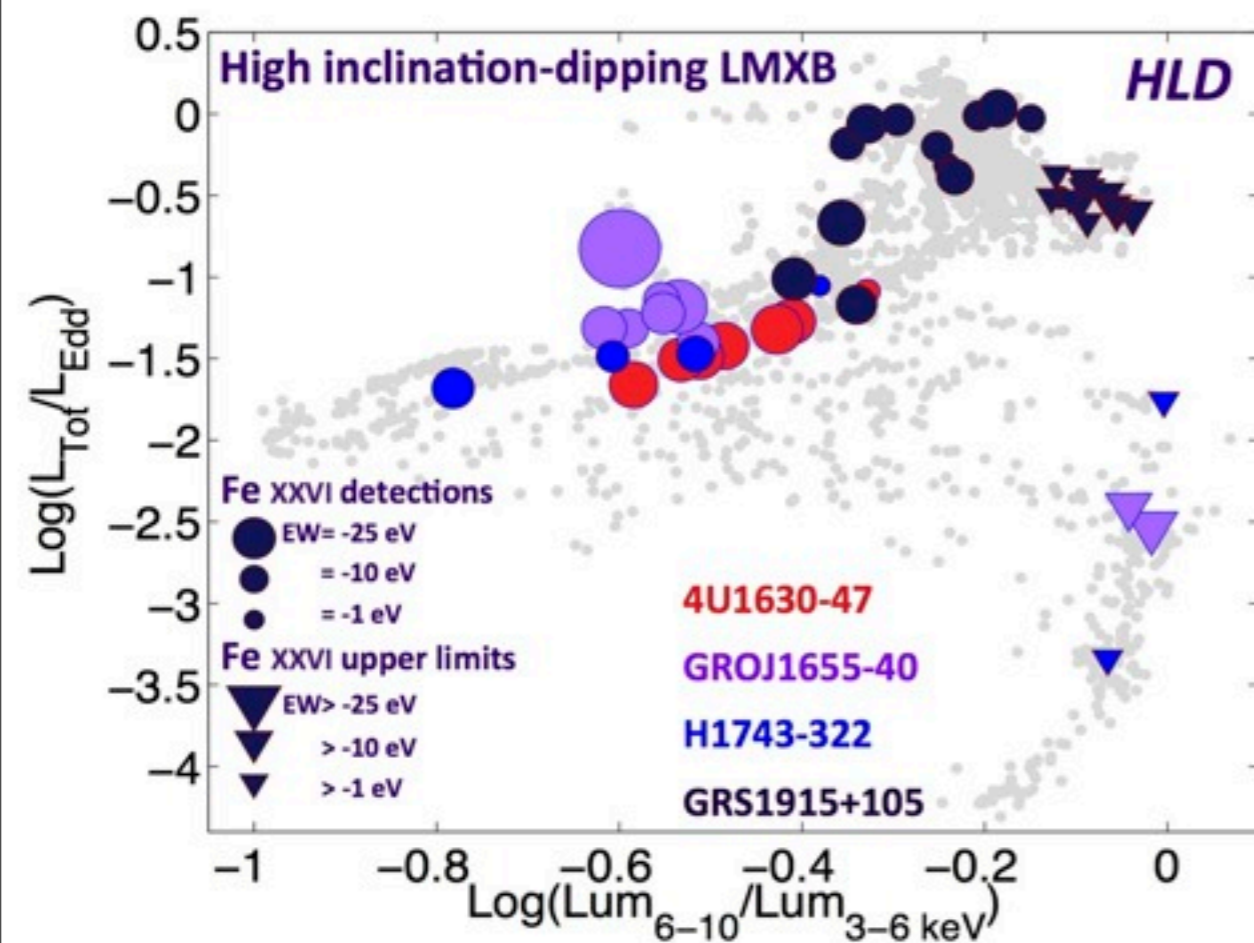
- Large data base (~15 years of **RXTE monitoring**): systematic studies
- Shape of the **HID** seems to depends on the inclination



Dunn et al. 2010

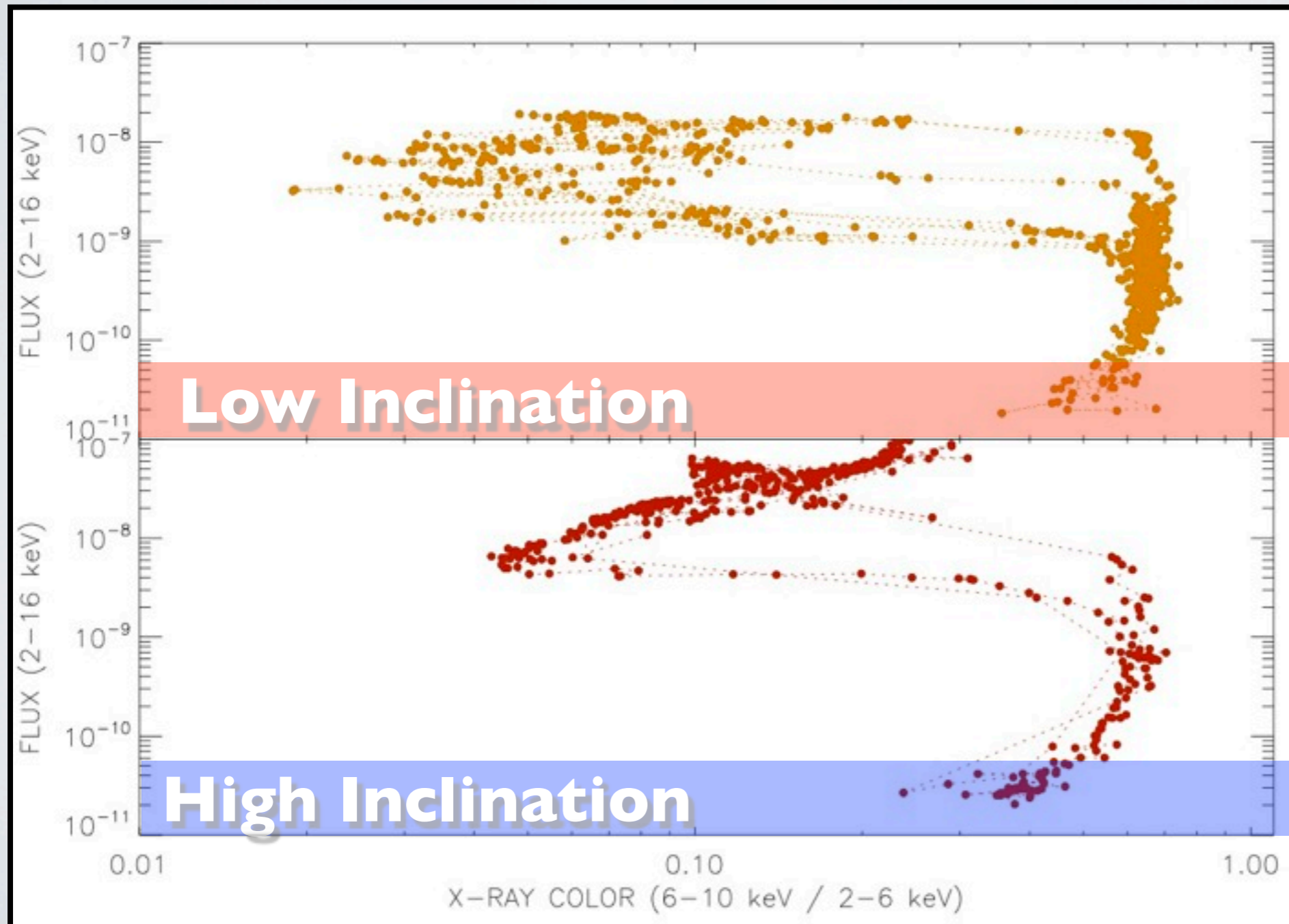
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A CLOSER VIEW...

- RXTE absorption corrected fluxes (Dunn et al. 2010)



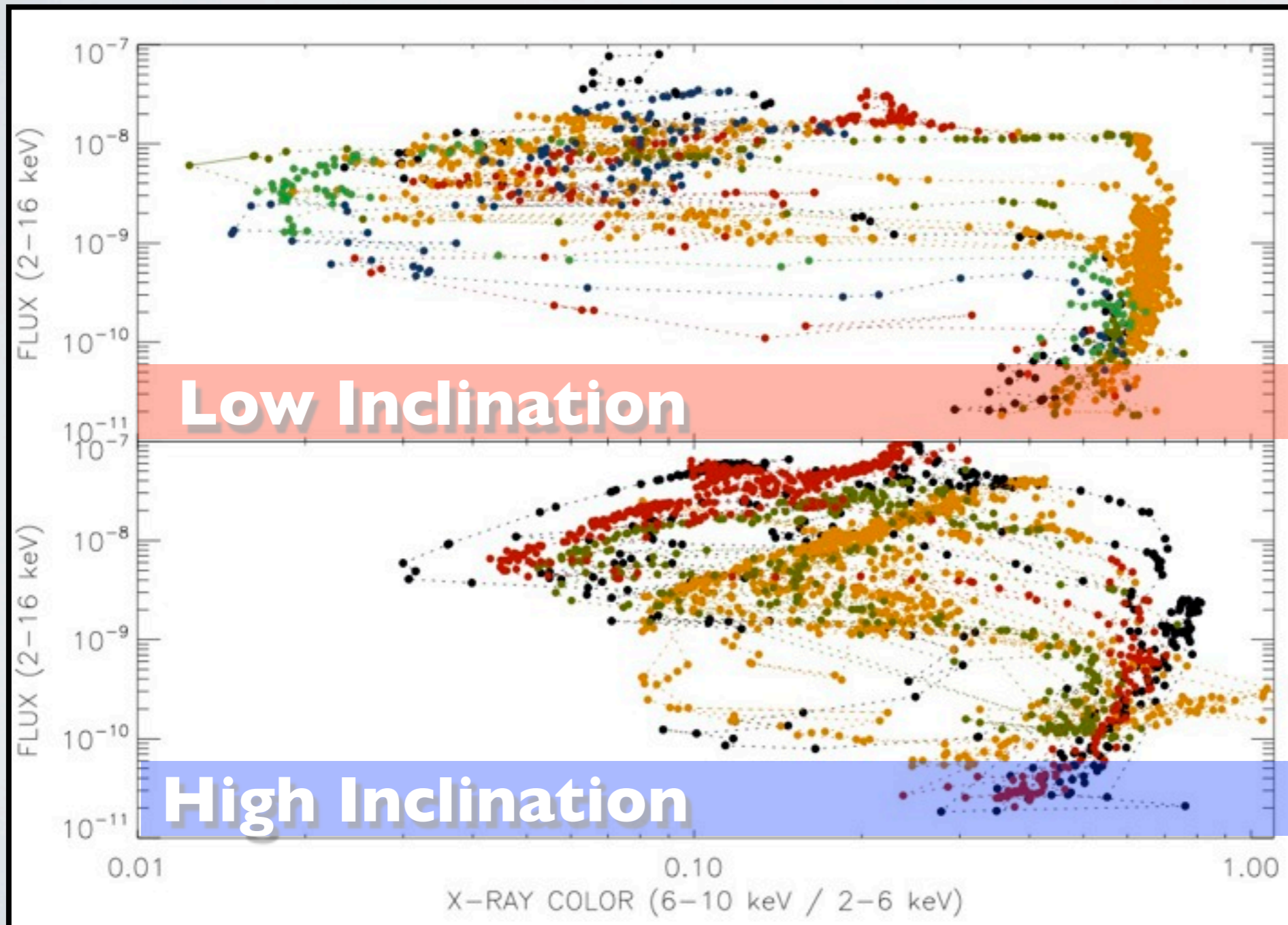
GX 339-4

GRO J1655-40

Muñoz-Darias, Coriat et al. in prep.

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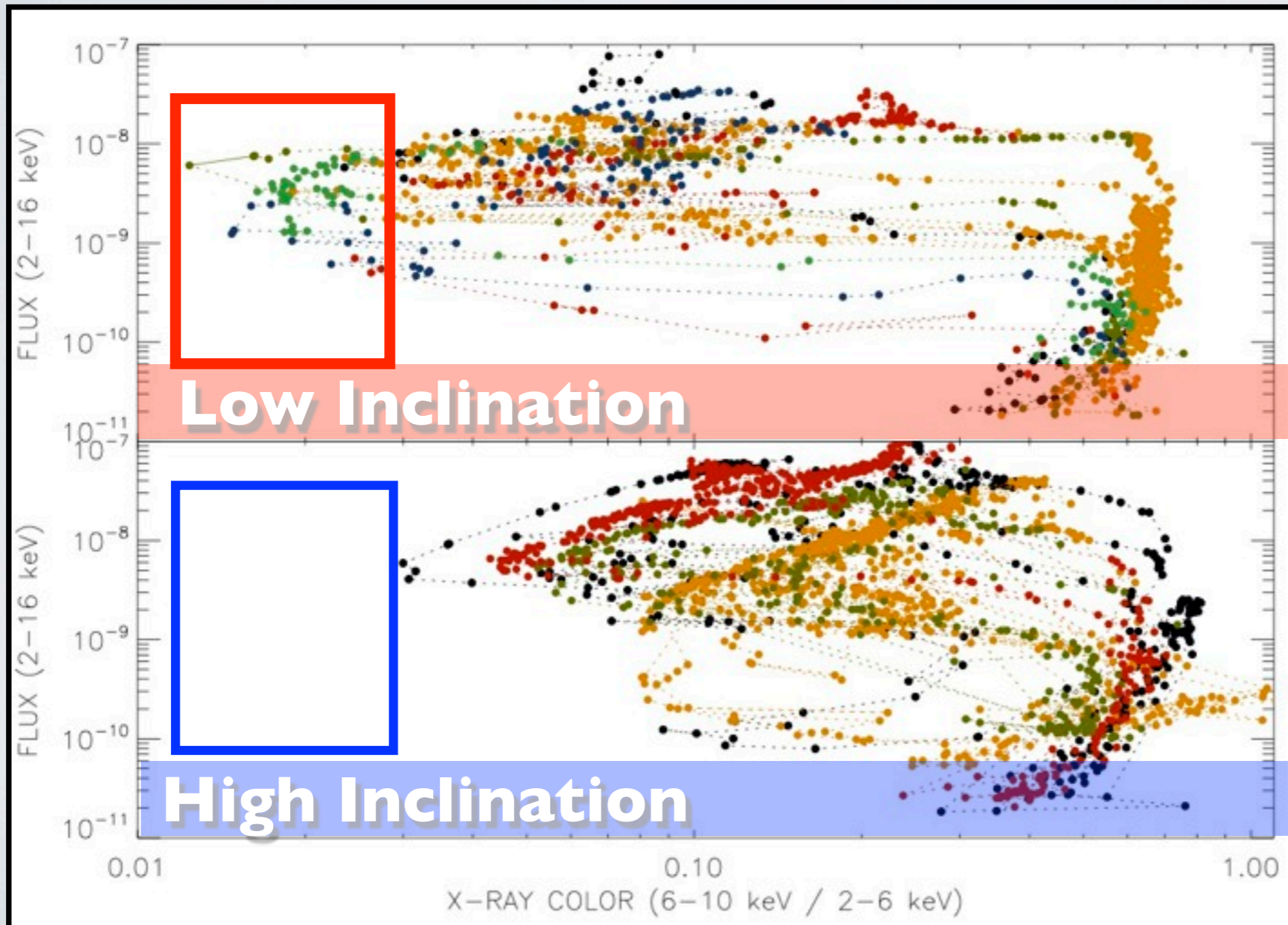
4U 1543-47
GX 339-4
XTE J1650-500
XTE J1859+226
XTE J1817-330
XTE J1720-318

XTE J1550-564
4U 1630-47
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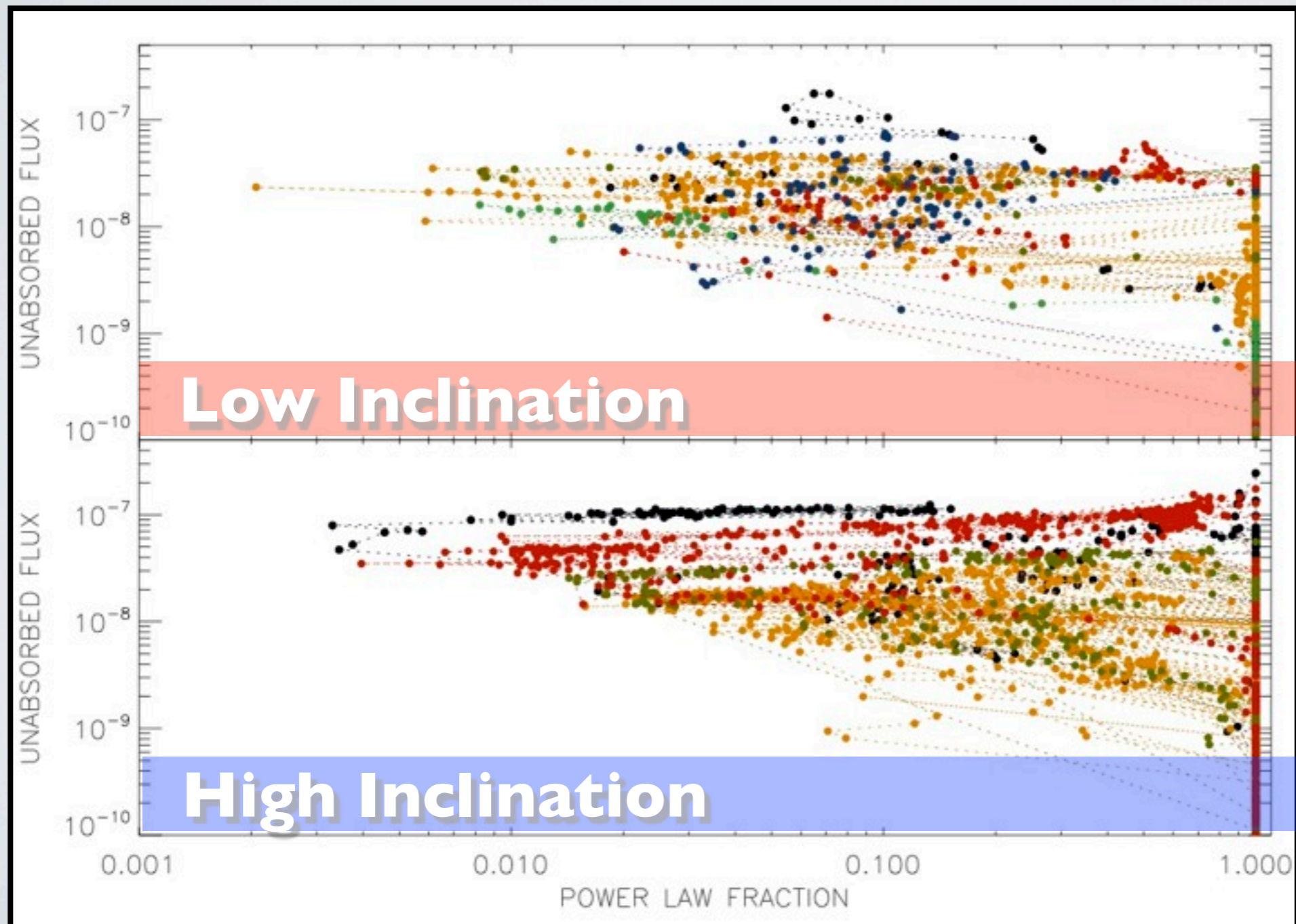
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- Disc and Power Law fluxes Fits (Dunn et al. 2010)



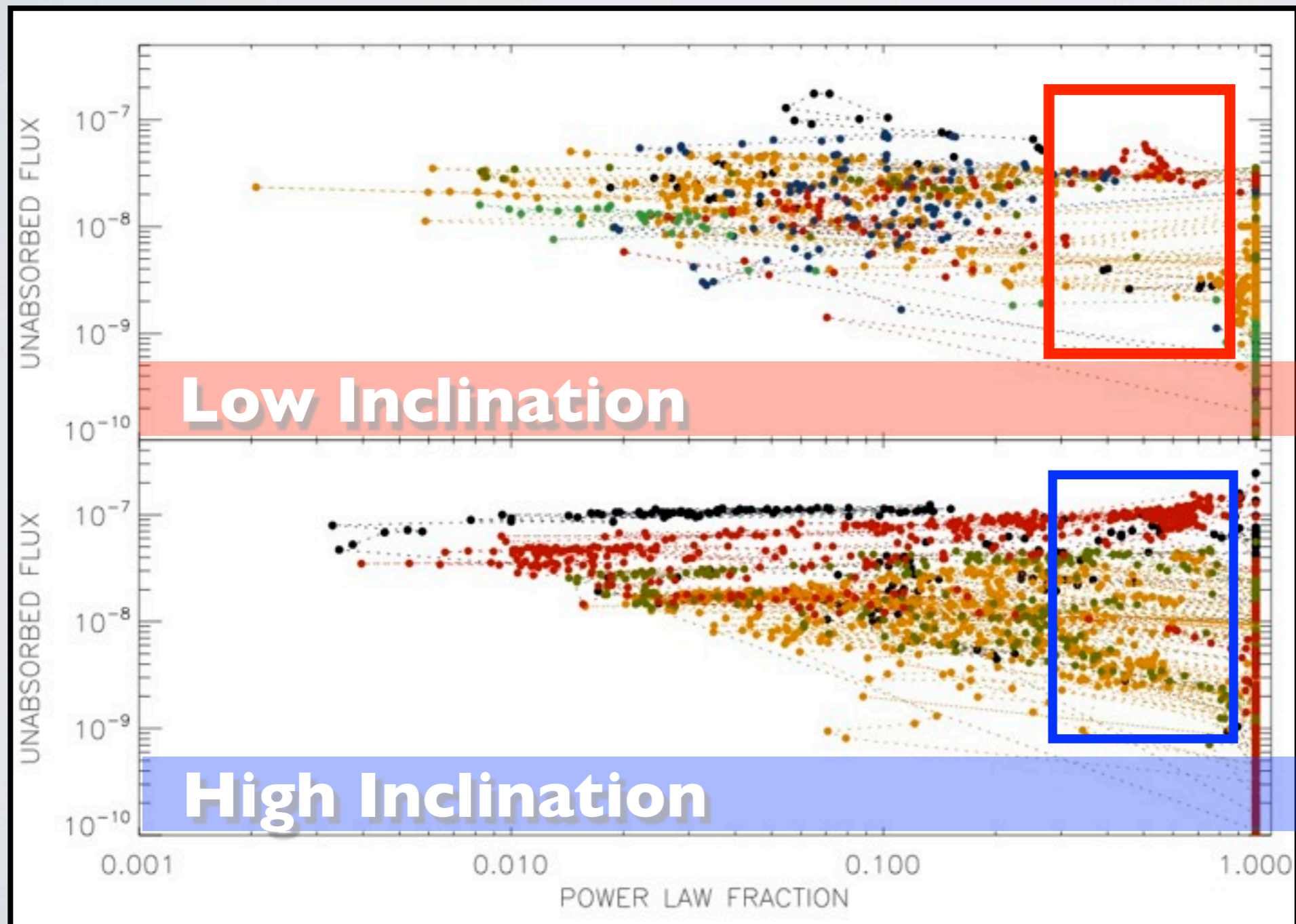
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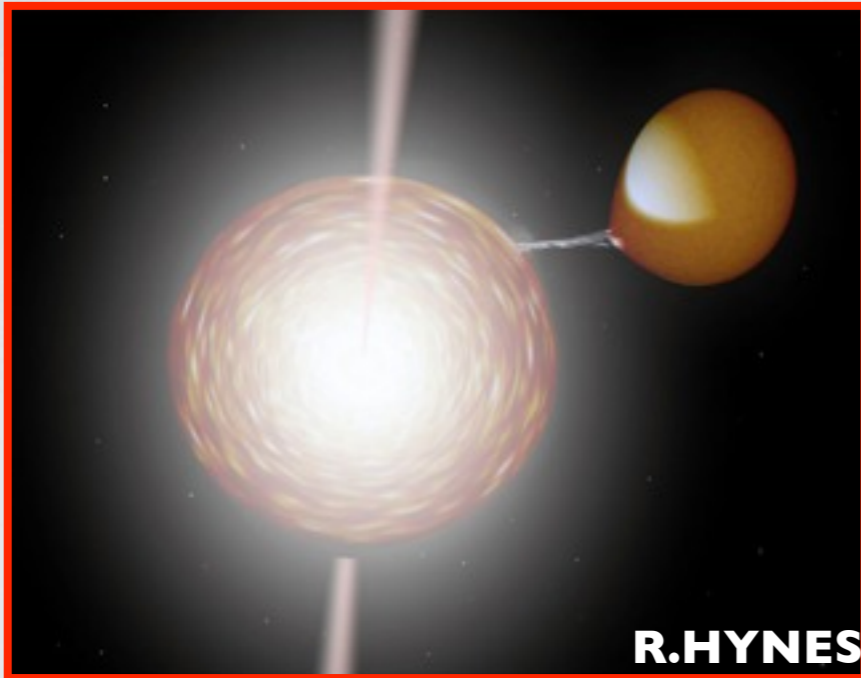
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ACCRETION DISCS AND LINE-OF-SIGHTS

- Low inclination disc dominated by gravitational redshift

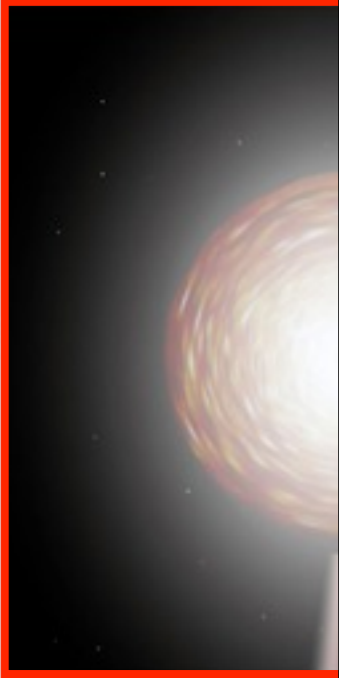


- Light is blue shifted when looking edge-on

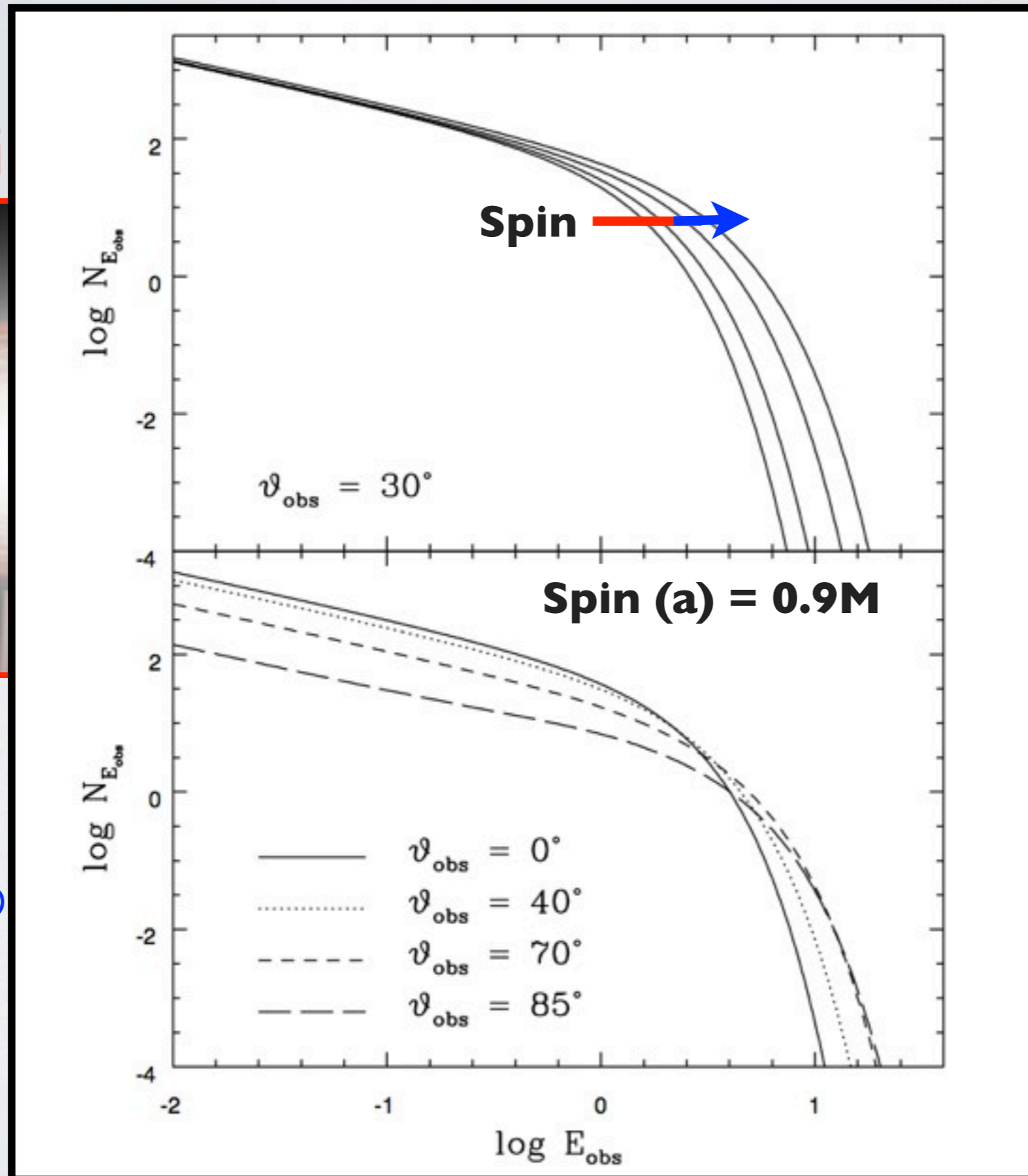


ACCRETION DISCS AND LINE-OF-SIGHTS

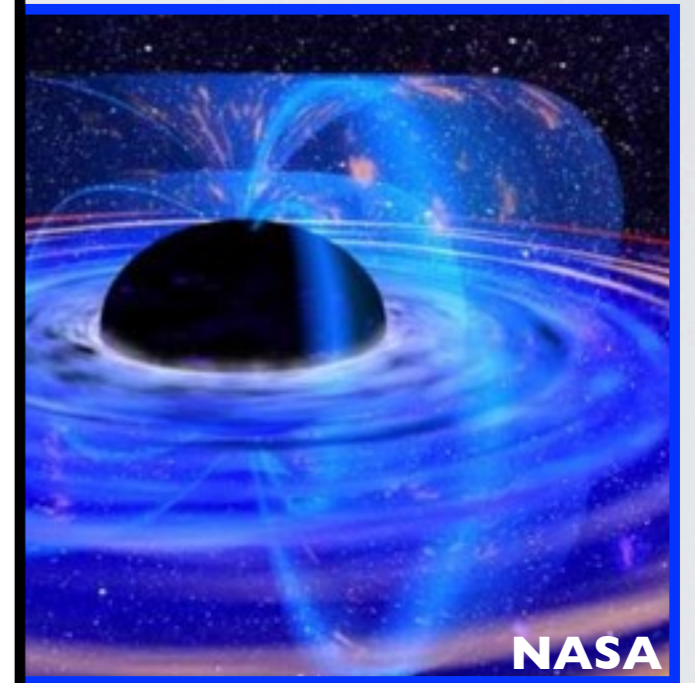
- Low incli



- Light is b



redshift

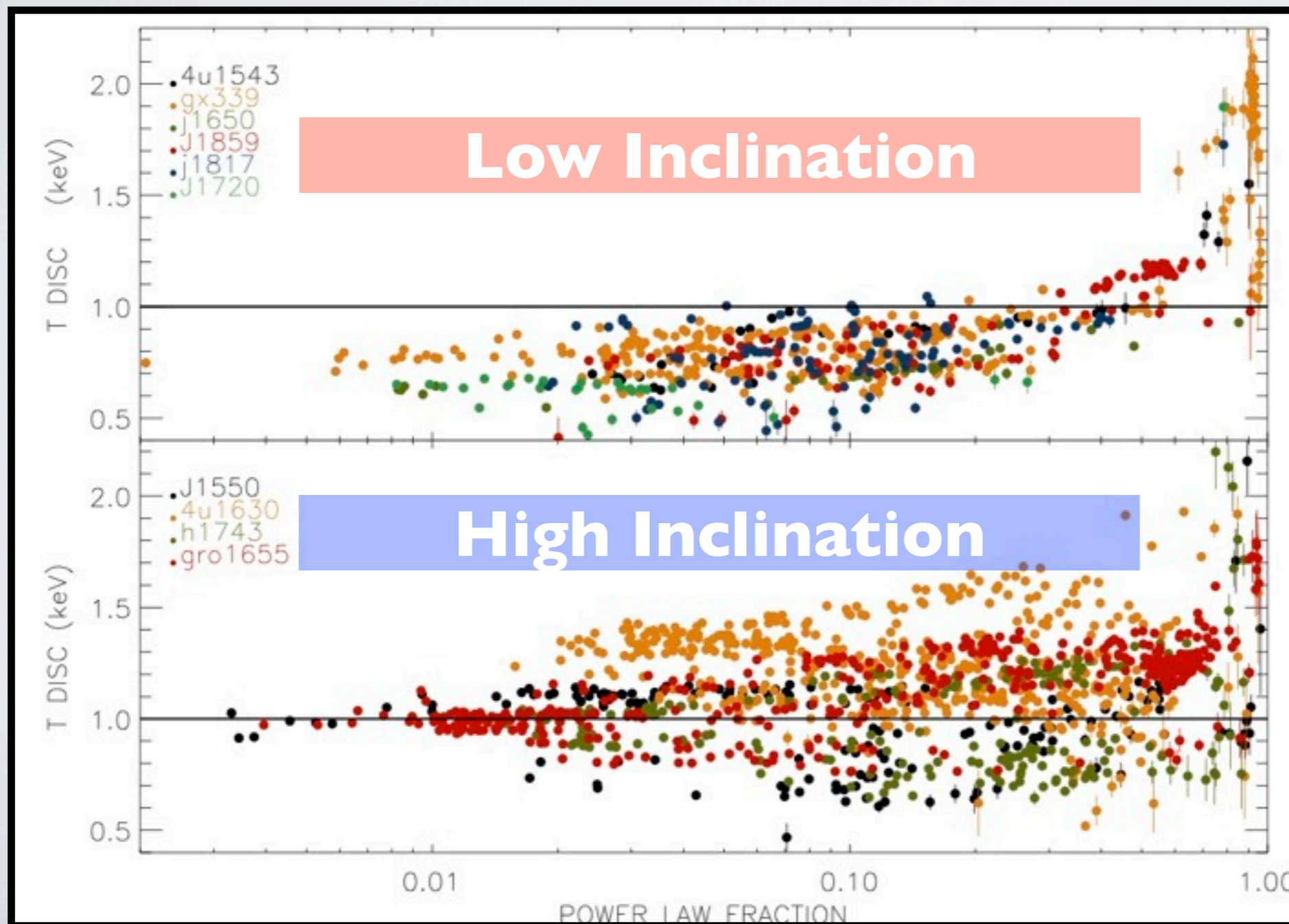


Li et al. 2005

DO WE REALLY SEE THAT?

Fits presented in Dunn et al. 2010 (Newtonian discs (DISKBB))

$$T_{\text{OBS}} = T_{\text{PEAK}} f_{\text{COL}} \mathbf{f}_{\text{GR}} [\mathbf{i}, \mathbf{spin}] \quad (\text{see e.g. Zhang, Cui \& Chen 1997; Cunningham 1975})$$

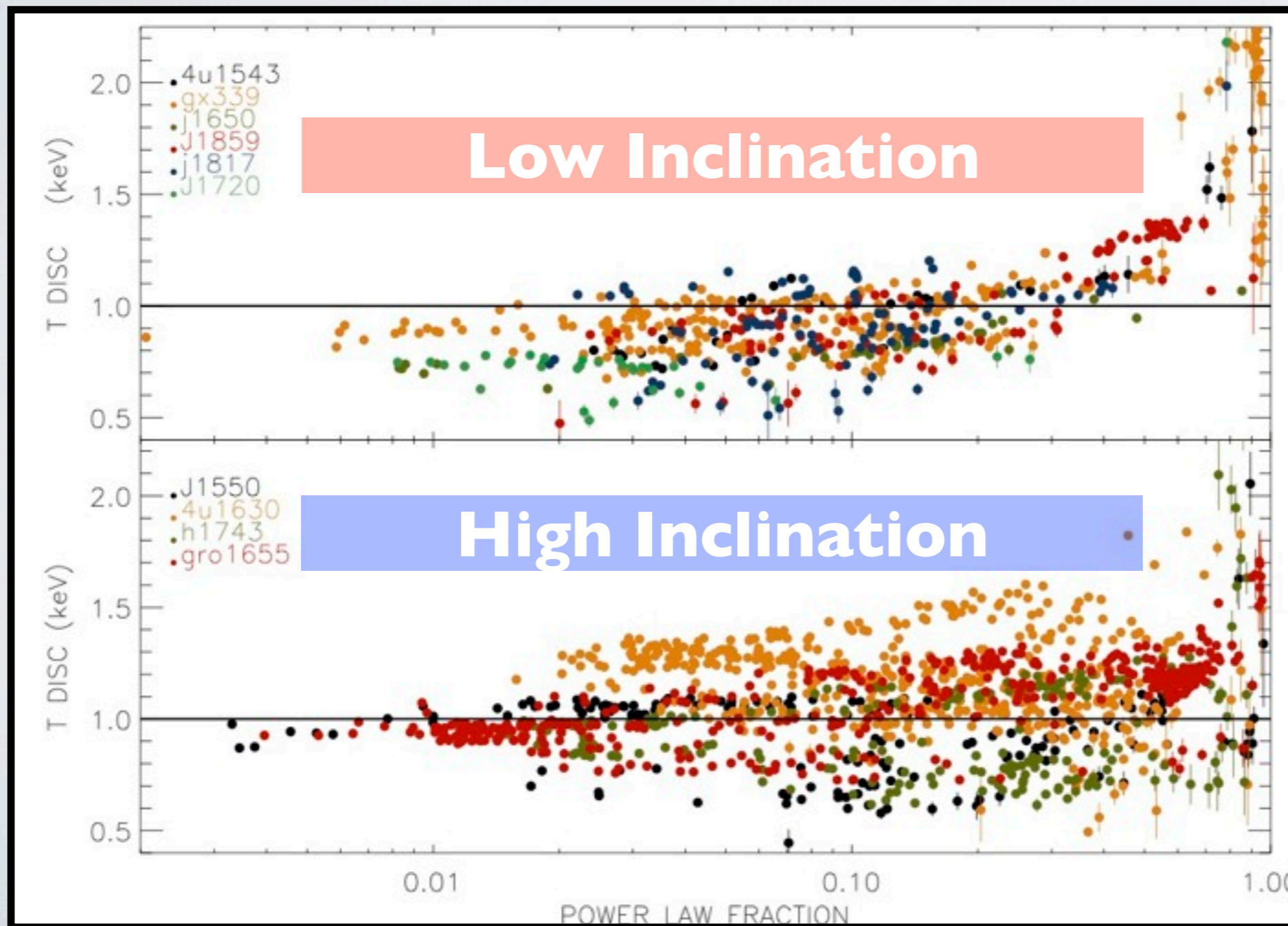


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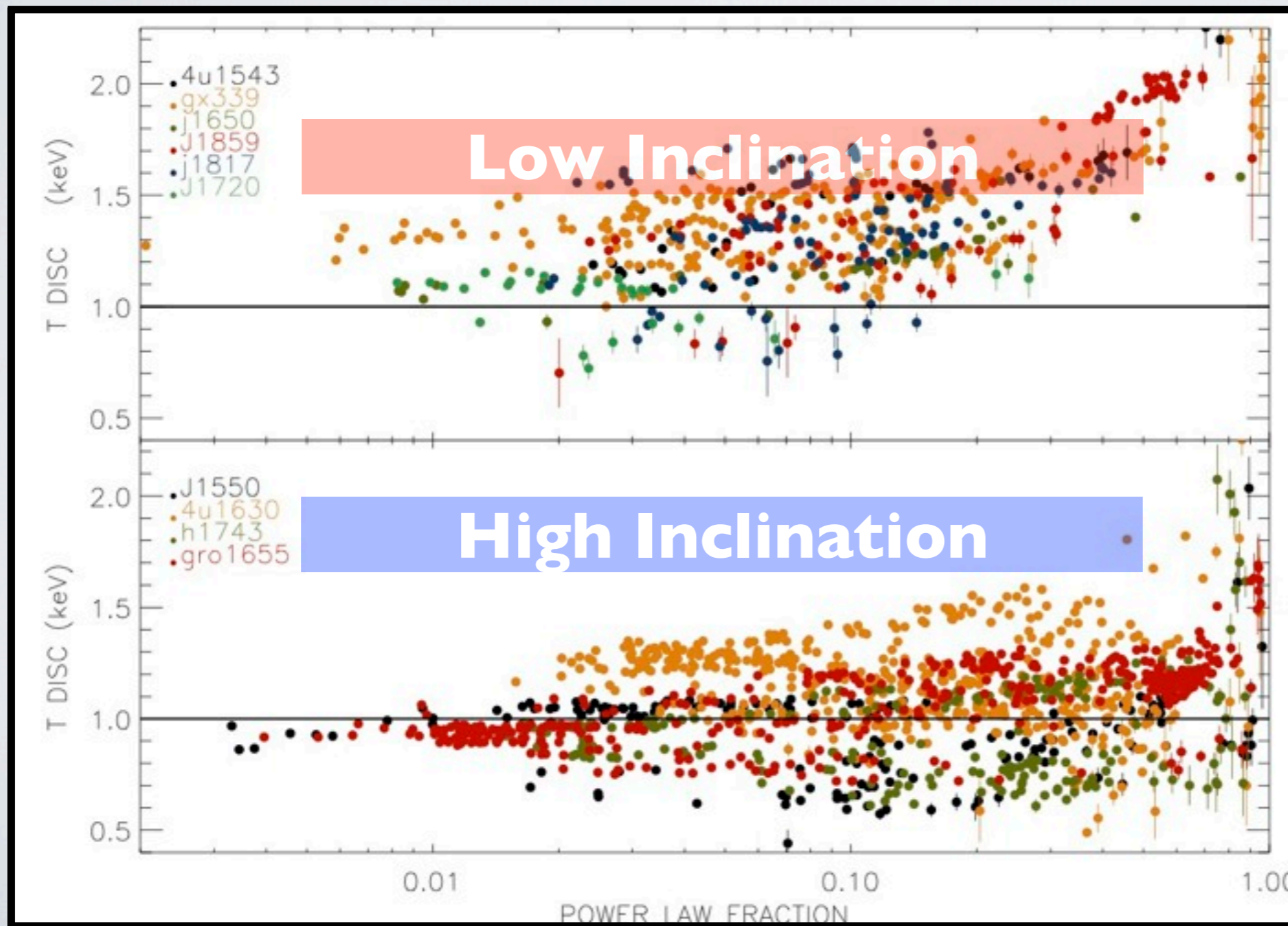
$$f_{\text{GR}} [i, a=0.0]$$

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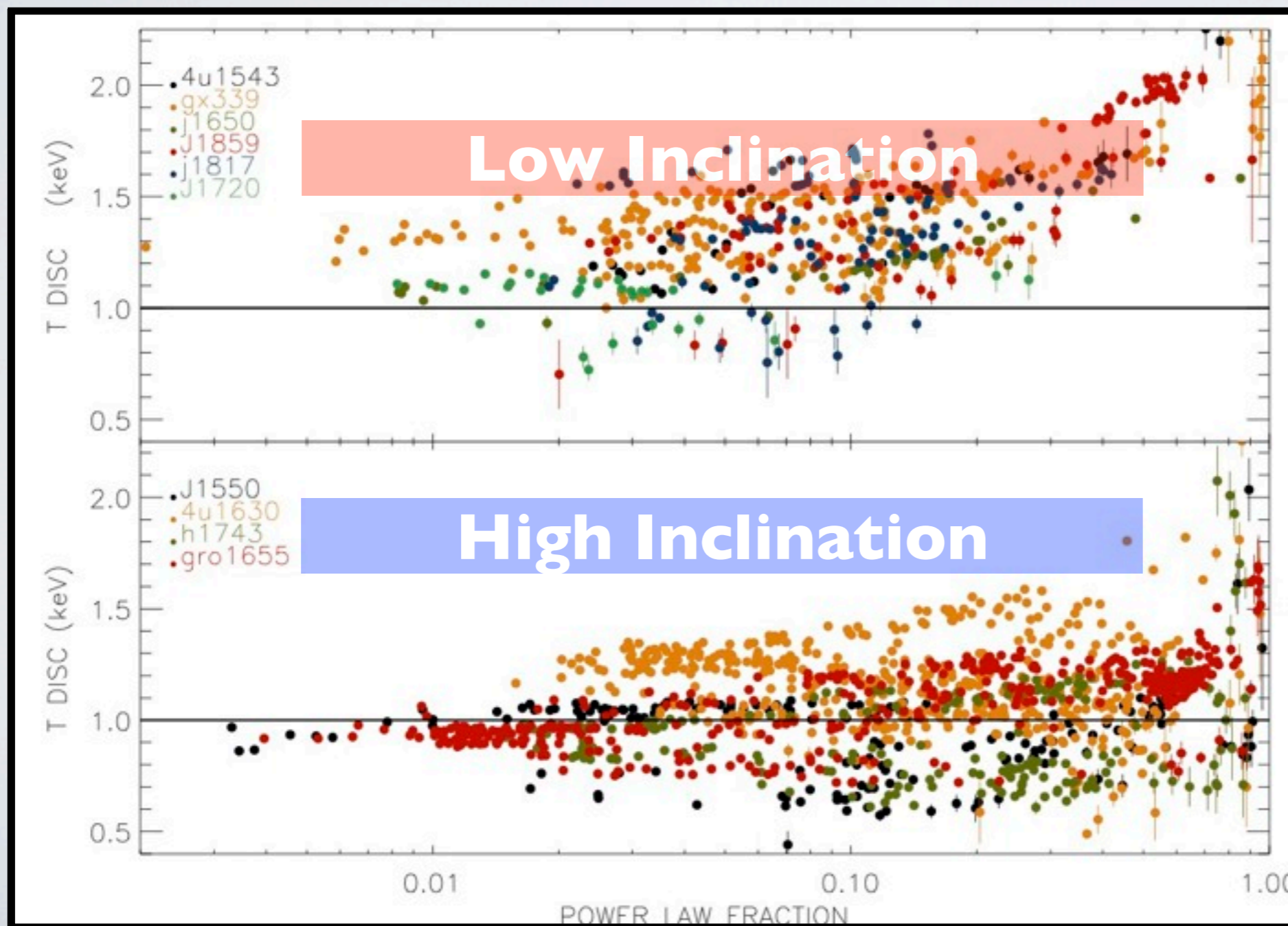
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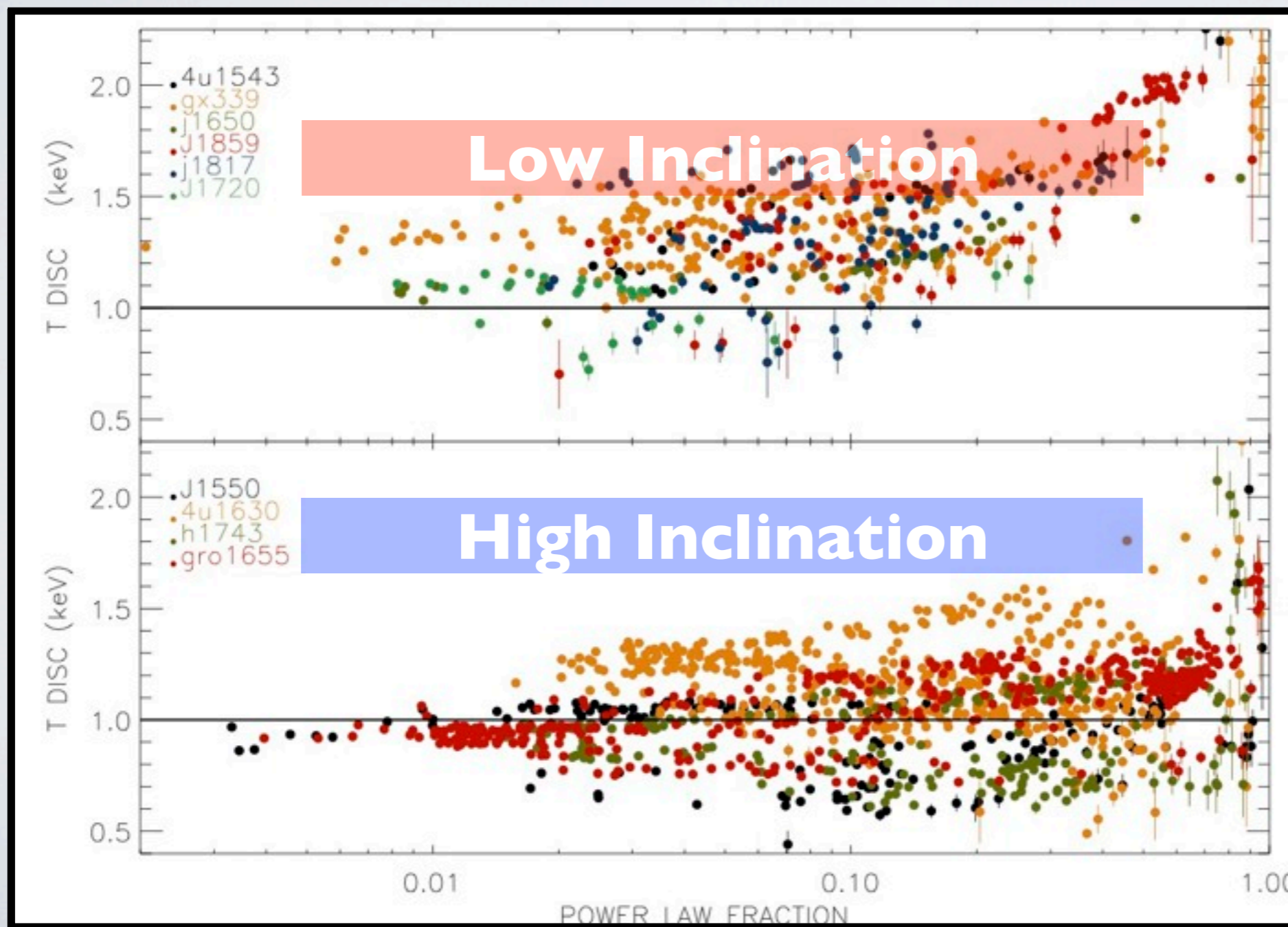
Does f_{COL} depends on the line-of-sight?

Muñoz-Darias, Coriat et al. in prep.

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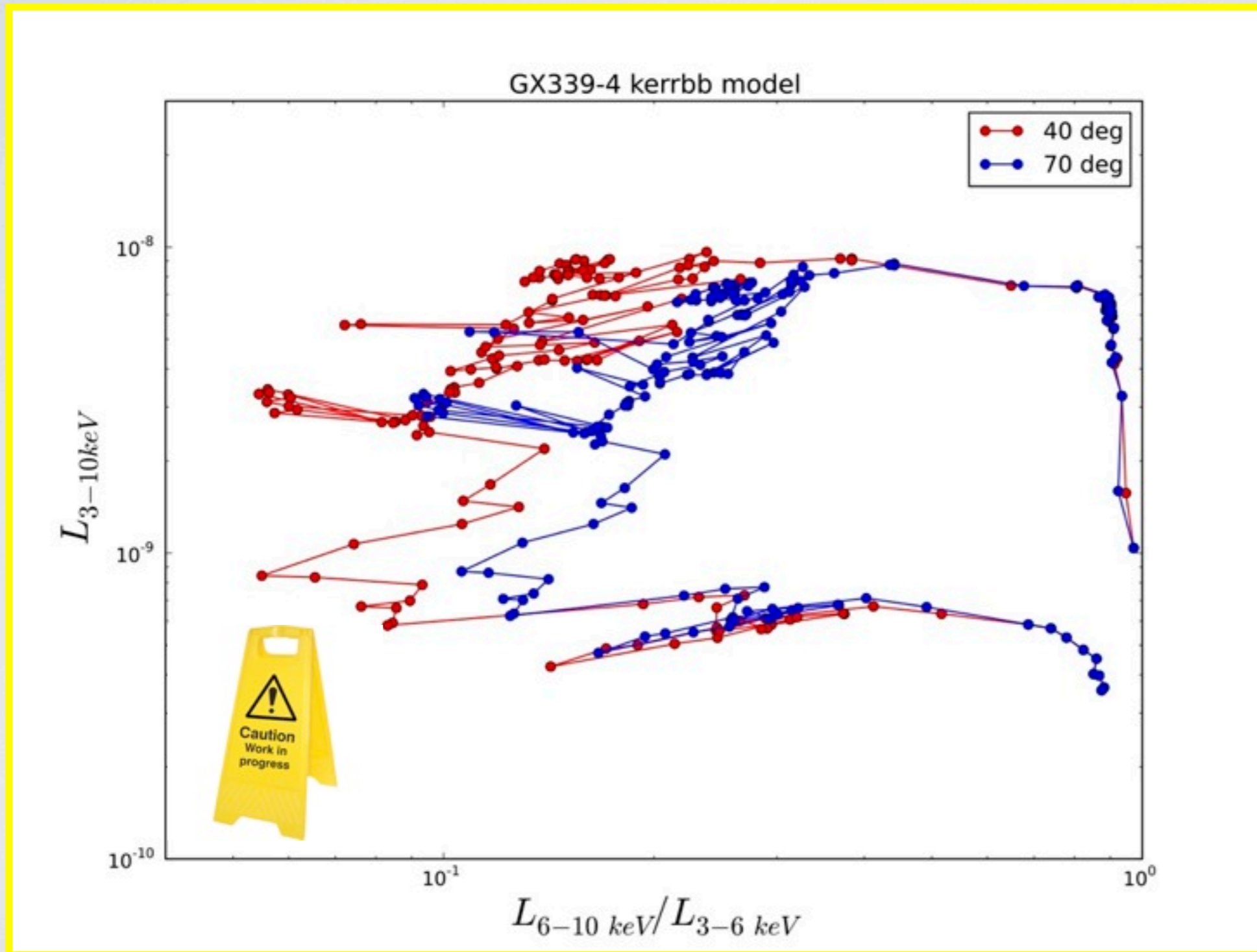
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Does f_{COL} depends on the line-of-sight?

T_{disc} measured with RXTE

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DOES IT EXPLAIN EVERYTHING?



SUMMARY

- ★ Shape of the HID depends on the inclination
- ★ Low inclination Black holes look softer
 - General relativity effects on accretion disc explain *at least part* of the phenomenology
 - Mid-high spins values seem favored

You will see more about this soon.