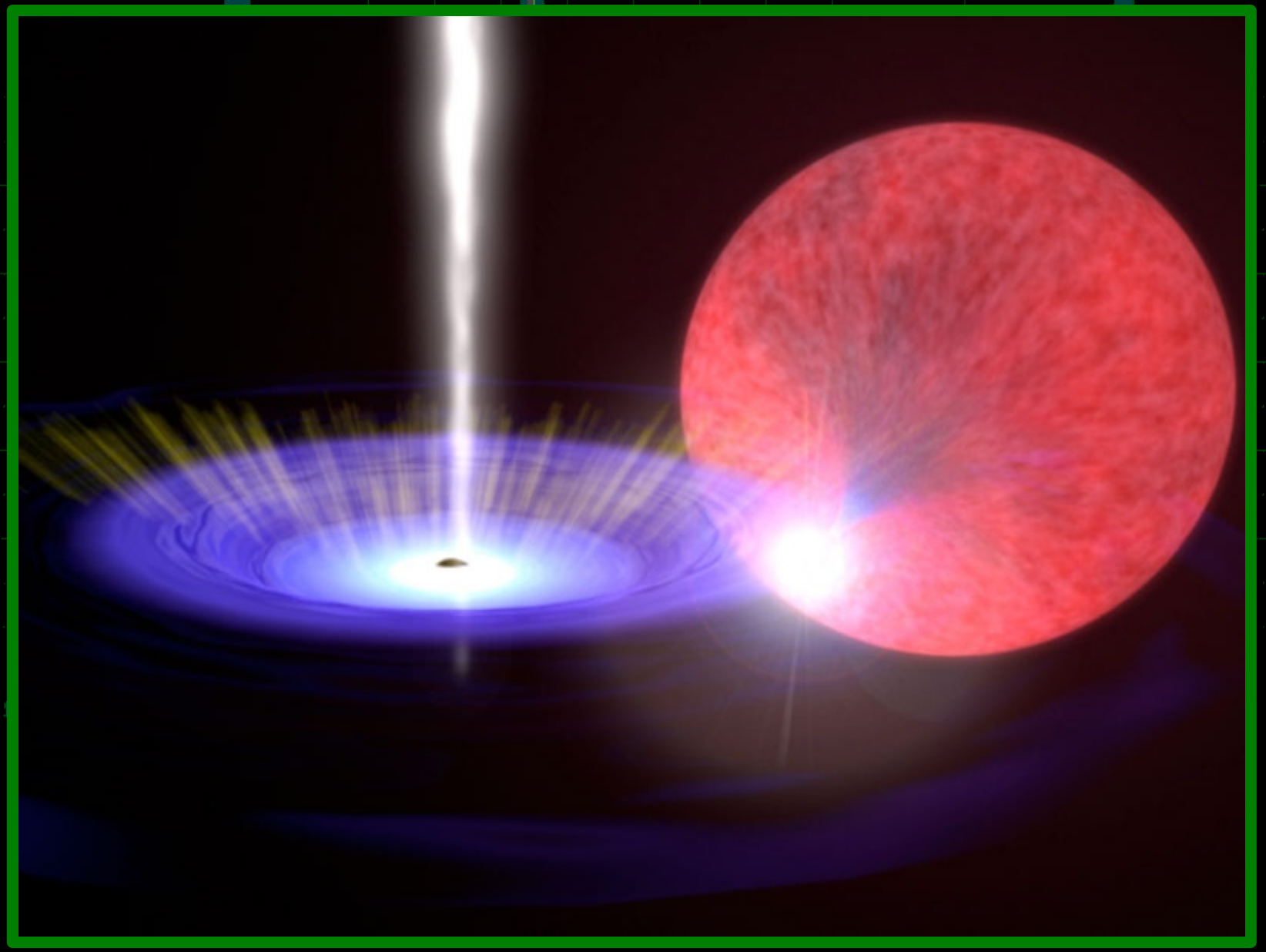

What do you expect to discover
after 12 years of XTE?

IGR J17091-3624
the last treasure discovered with RXTE

Diego Altamirano

Belloni, T.; Linares, M.; van der Klis, M.; Wijnands, R.; Curran, P. A.;
Kalamkar, M.; Stiele, H.; Motta, S.; Muñoz-Darias, T.;
Casella, P.; Krimm, H.

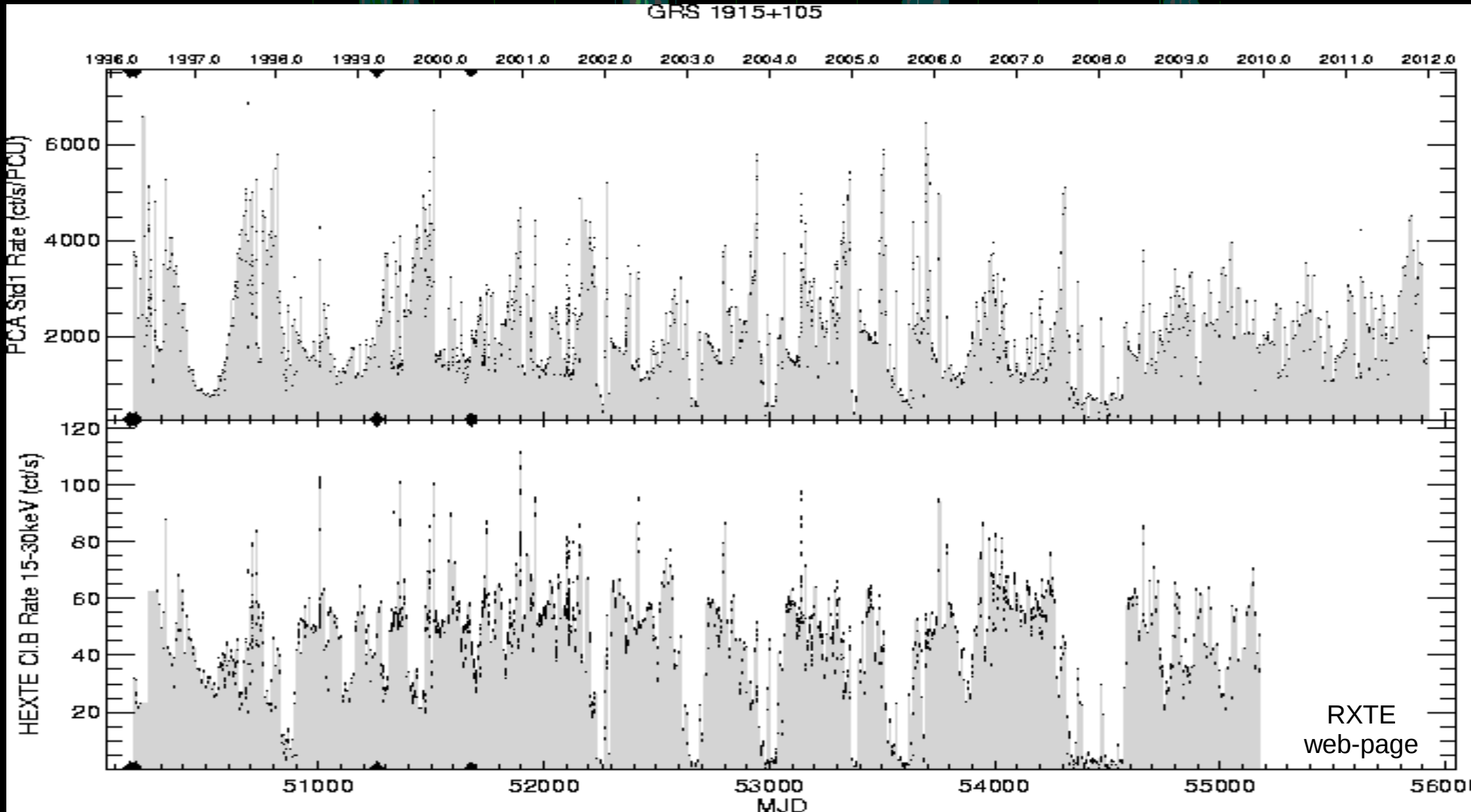
GRS 1915+105

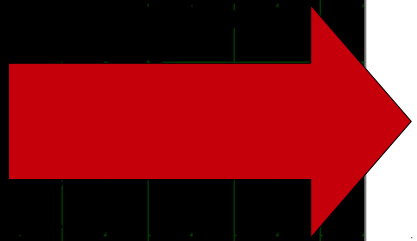


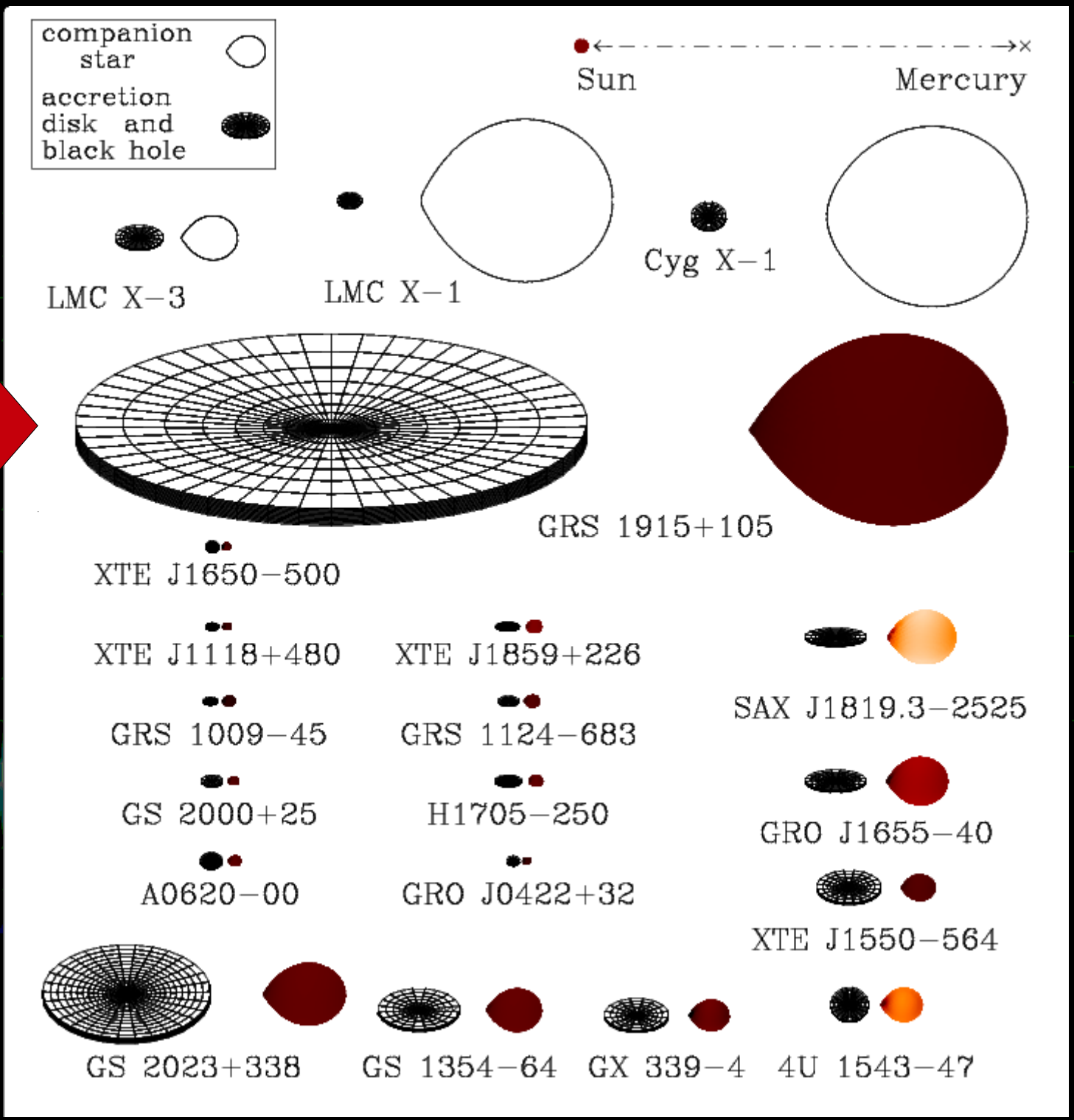
GRS 1915+105

- Discovered in August 1992 (WATCH all-sky monitor)
- ~14 +- 4 M_o Black hole
- ~12 kpc
- ~ 33 days orbital period
- ~1.2 M_o K-M III companion star

GRS 1915+105

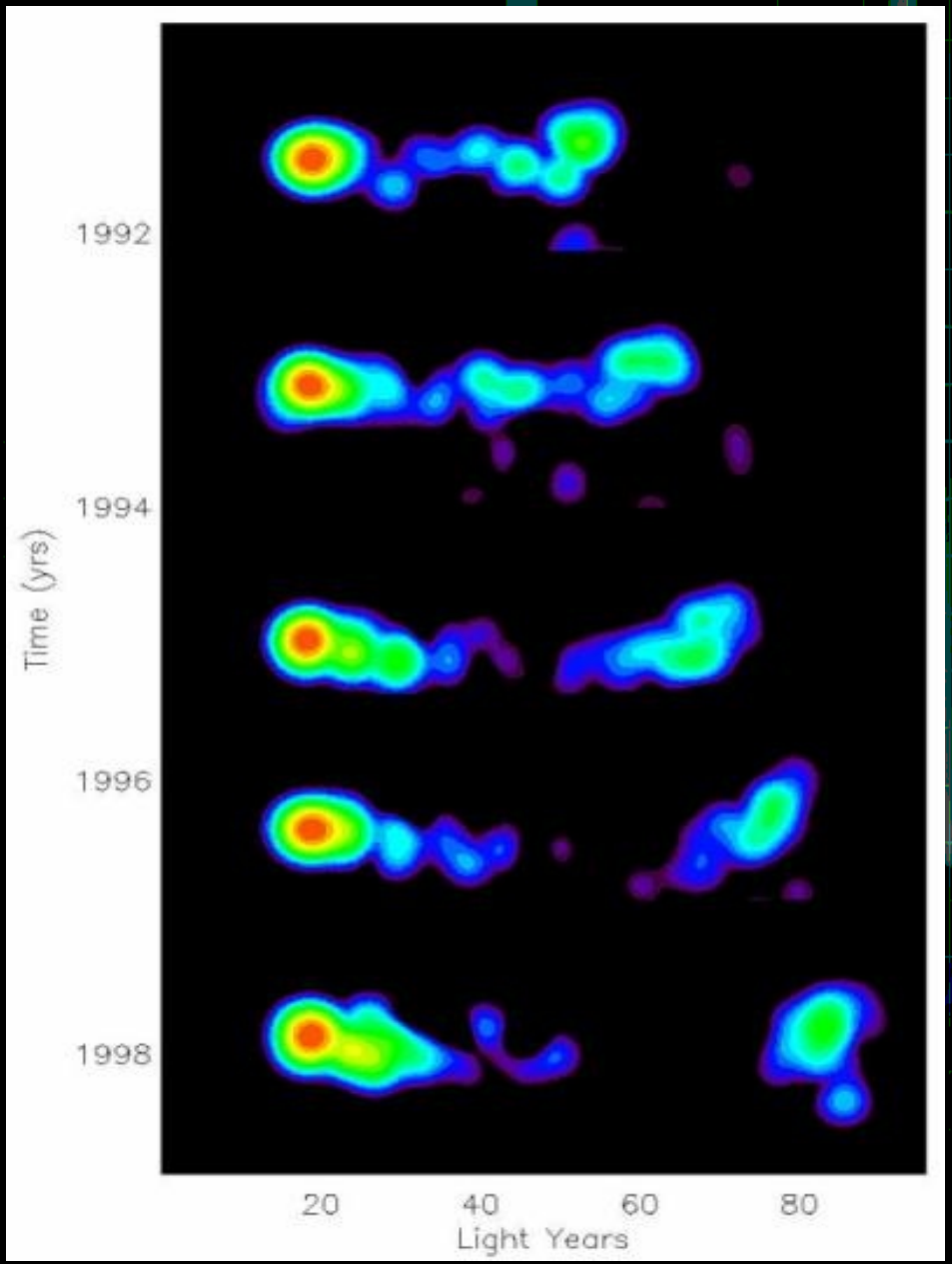

GRS 1915+105
1996.0
1997.0
1998.0
1999.0
2000.0
2001.0
2002.0
2003.0
2004.0
2005.0
2006.0
2007.0
2008.0
2009.0
2010.0
2011.0
2012.0
PCA Std1 Rate (ct/s/PCU)
6000
4000
2000
120
HEXTE Cl.B Rate 15-30keV (ct/s)
100
80
60
40
20
51000
52000
53000
54000
55000
56000
MJD
RXTE
web-page



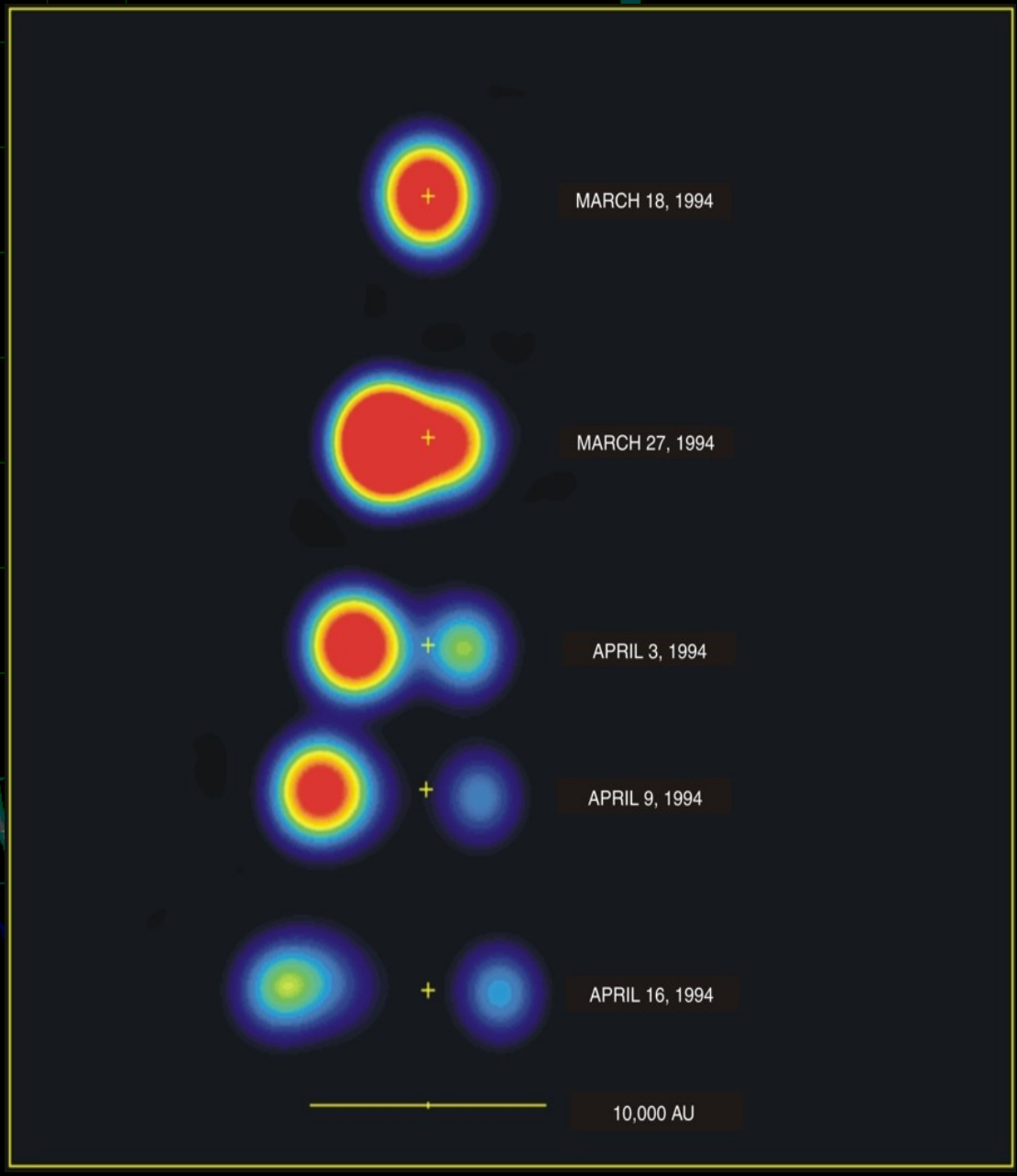


Courtesy Orusz

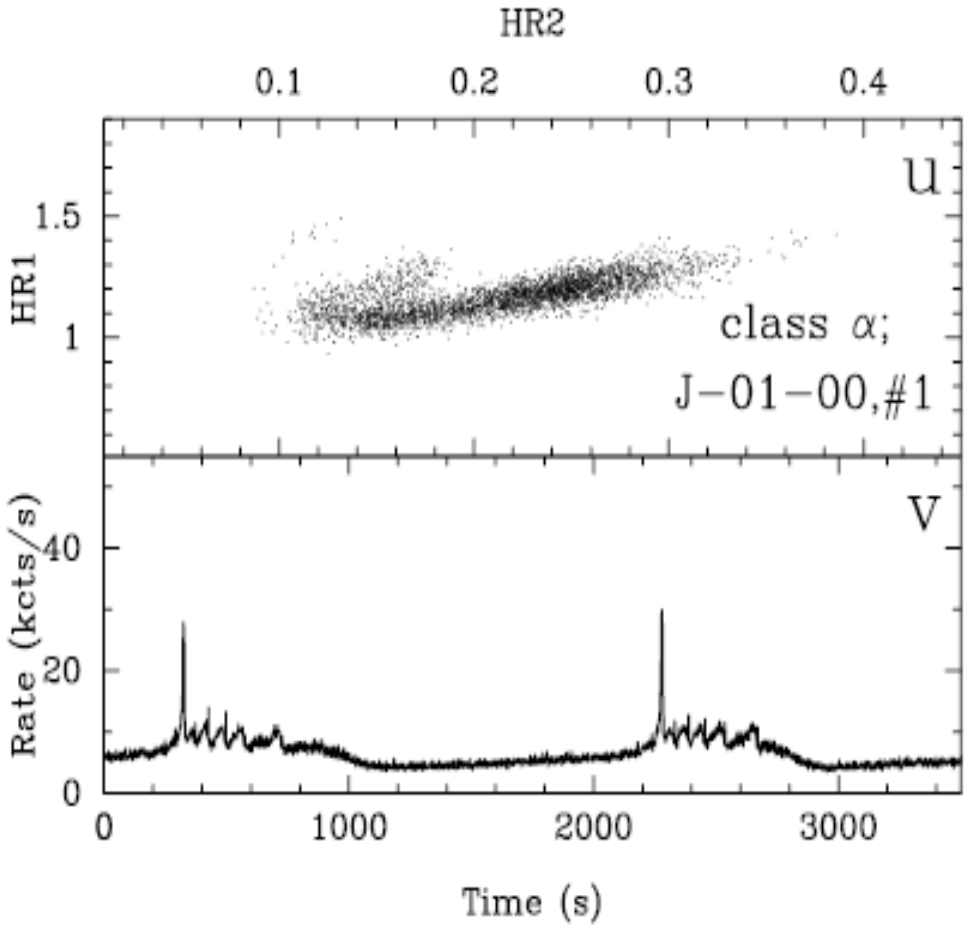
Quasar 3c279

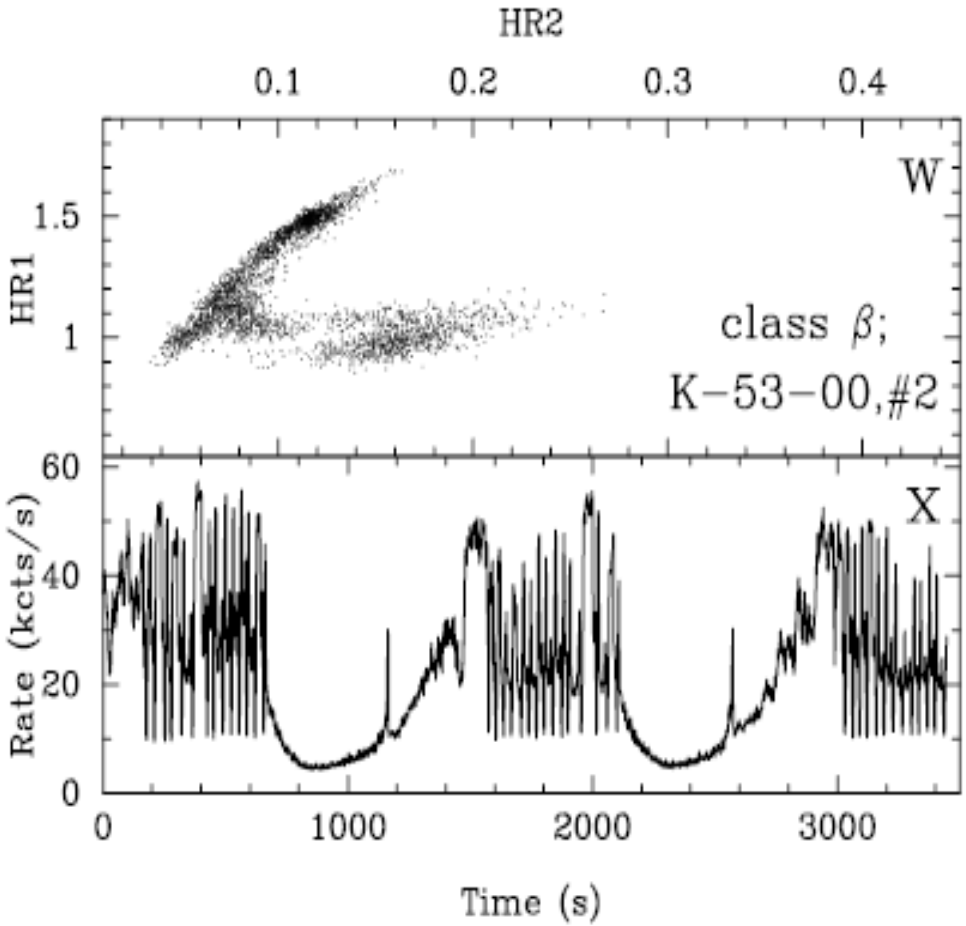


GRS 1915+105

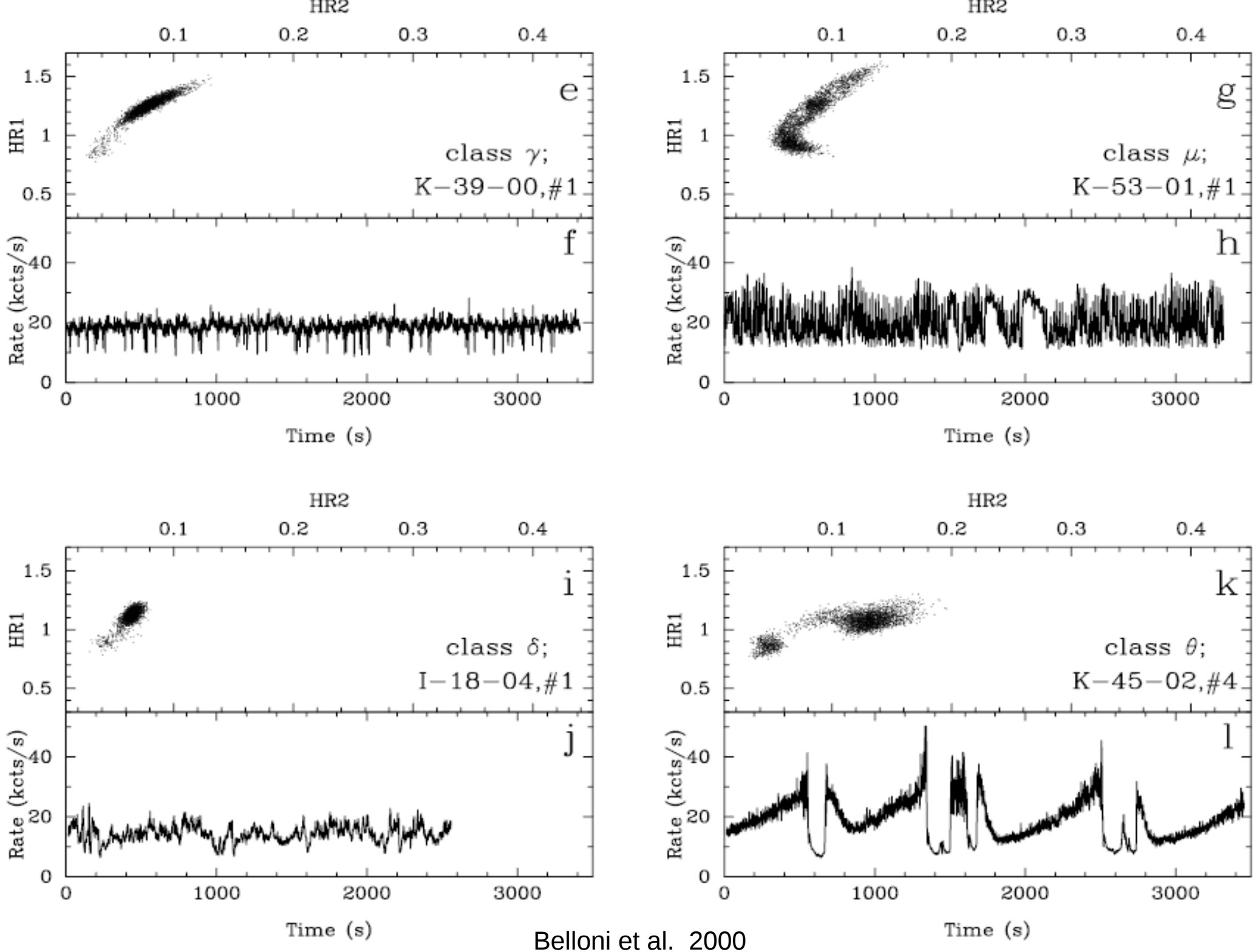


GRS 1915+105

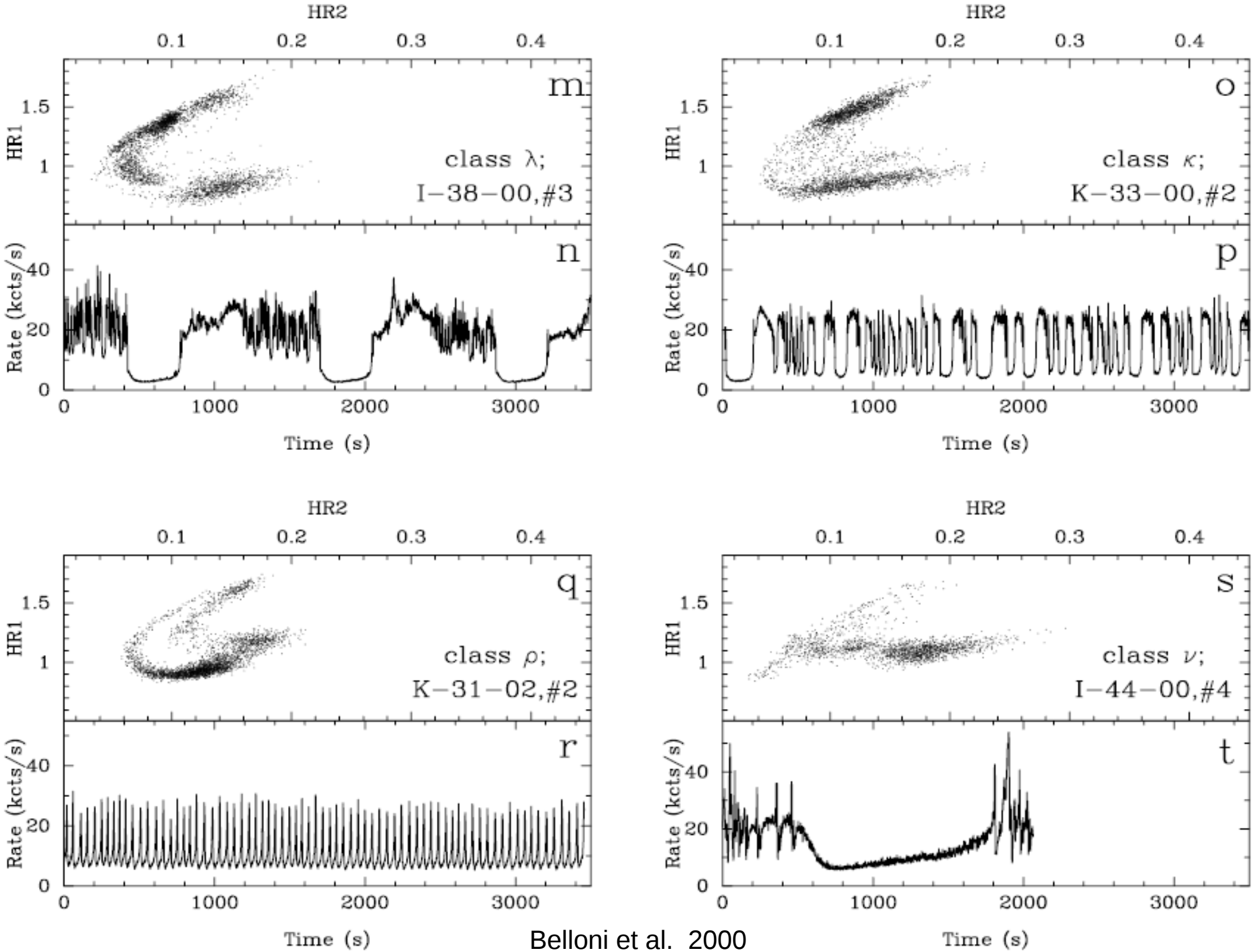




Belloni et al. 2000

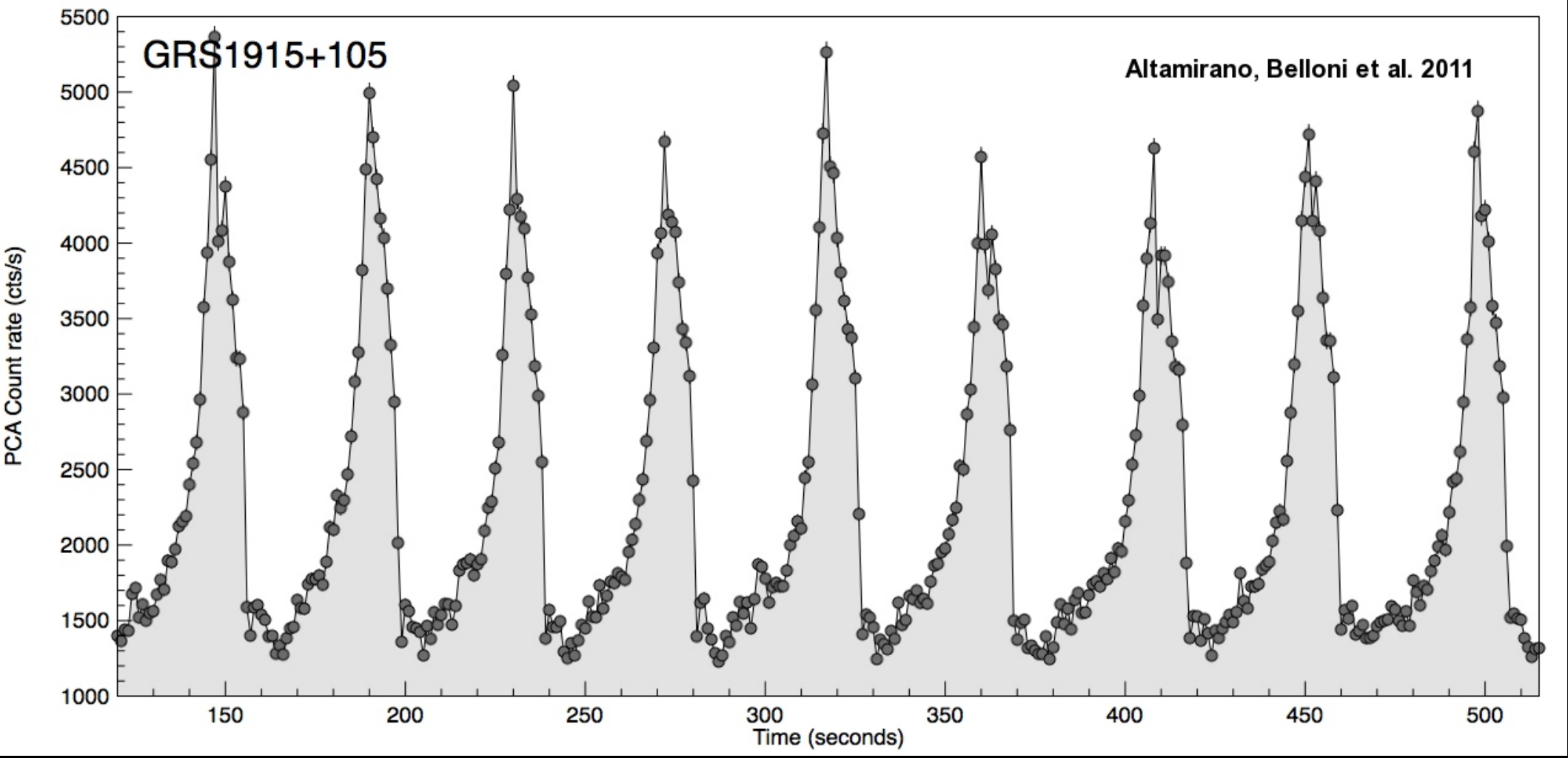


Belloni et al. 2000



Belloni et al. 2000

GRS 1915+105 Heartbeats



See recent Neilsen et al. papers for interpretation based on Chandra/RXTE data....

How can we know if we understand GRS 1915+105
If we don't have a second source to compare?

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...and so far ... the tip of the iceberg...

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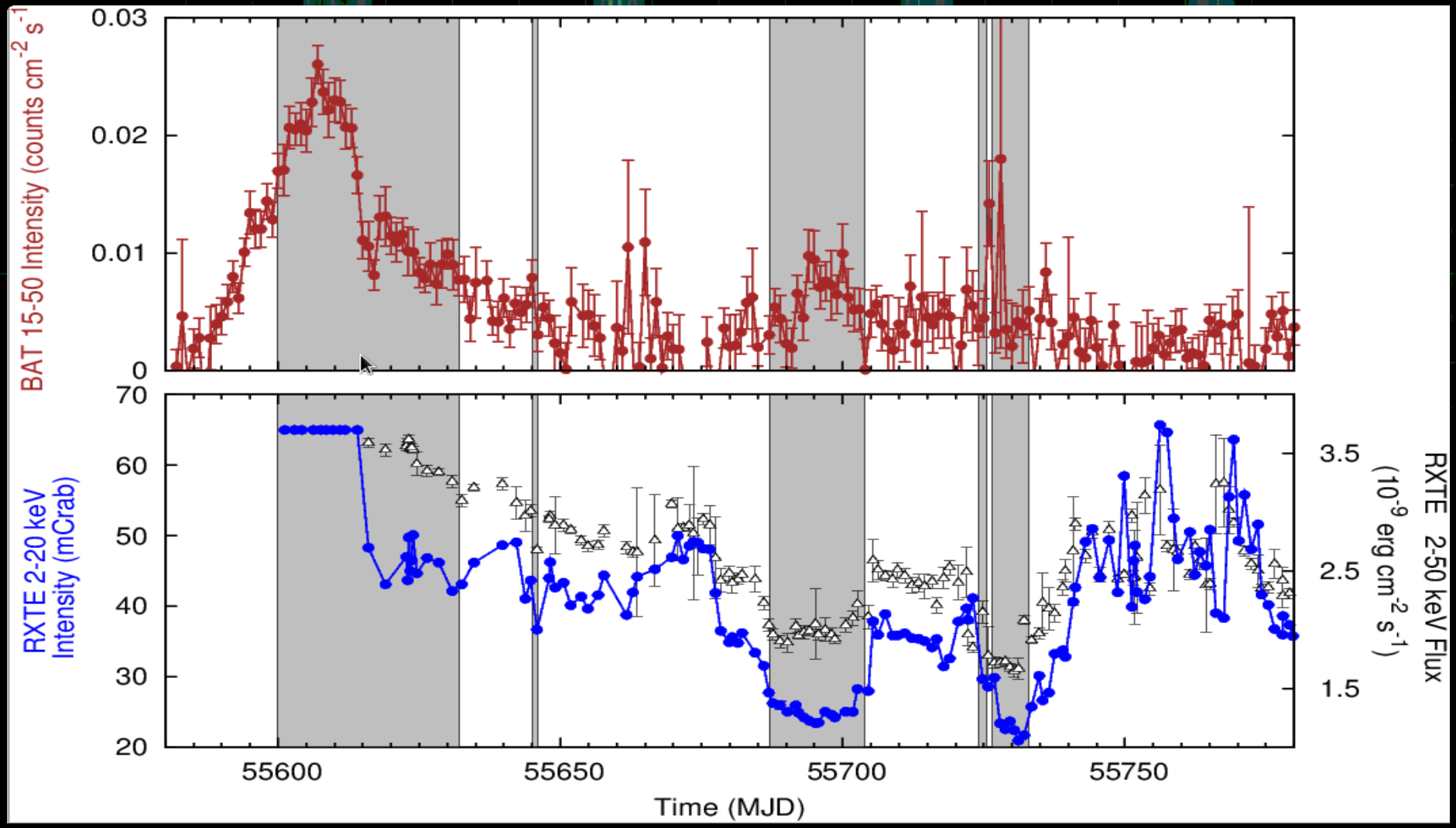

Altamirano et al. 2011

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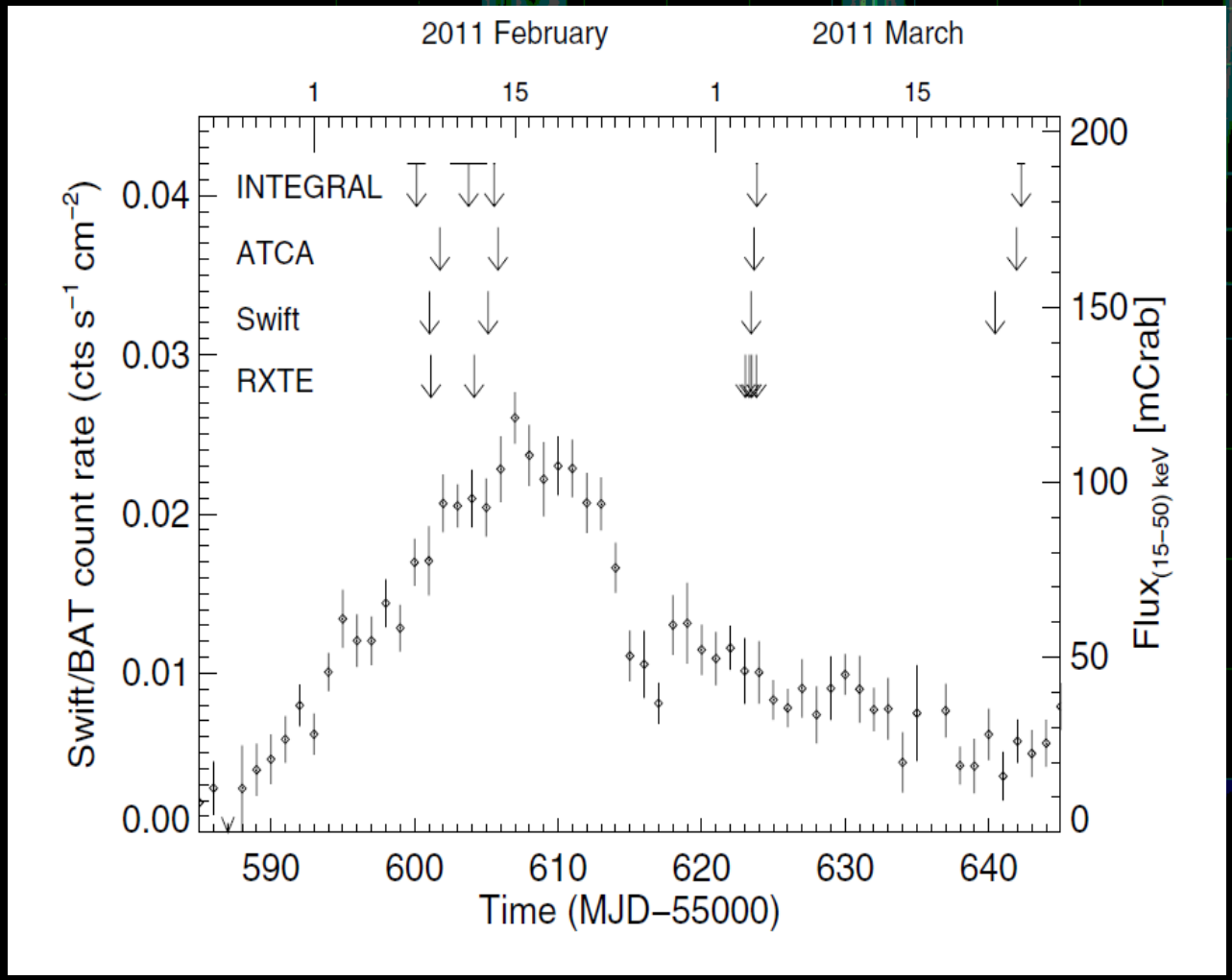

Obs.	$F_{5.5\ GHz}$ (mJy)	$F_{9\ GHz}$ (mJy)	α
A1	1.40 ± 0.05	1.24 ± 0.06	−0.25 ± 0.12
A2	1.53 ± 0.10	1.57 ± 0.10	+0.05 ± 0.19
A3	2.41 ± 0.10	1.13 ± 0.10	−1.54 ± 0.20
A4	0.17 ± 0.05	<0.08	

Rodriguez et al. 2011

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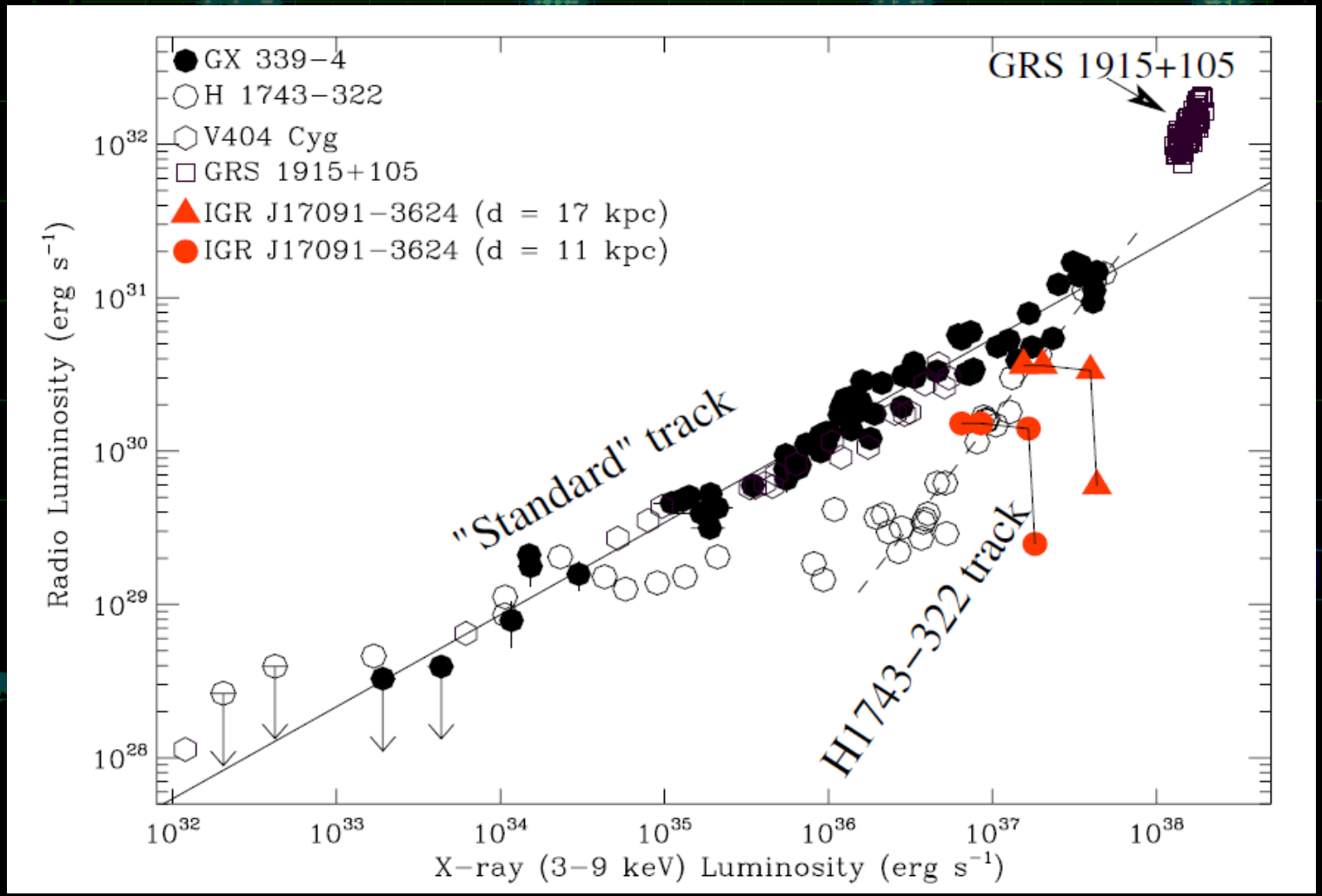
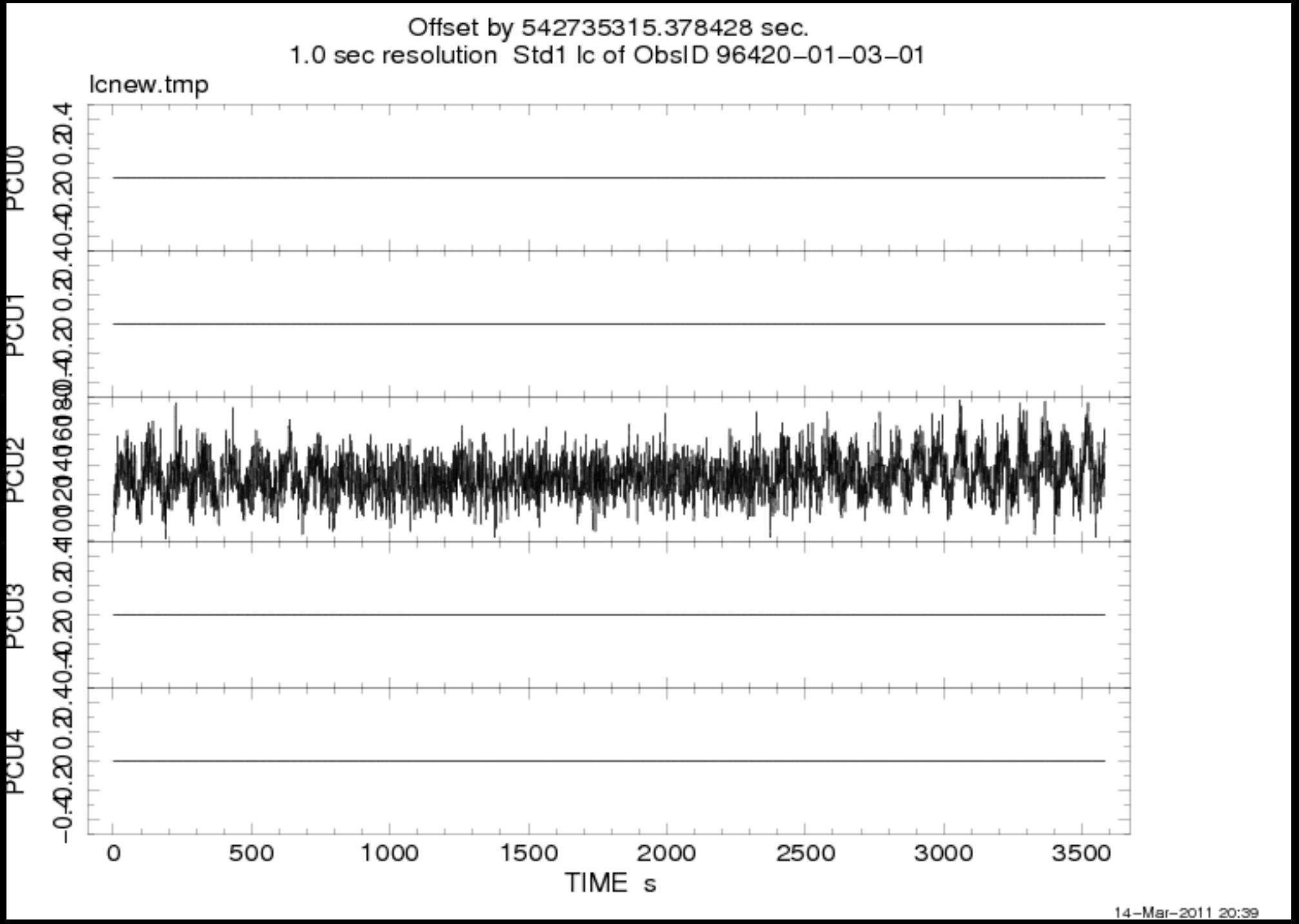


Rodriguez et al. 2011


Until ....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1.0 sec resolution Std1 lc of ObsID 96420-01-03-01
lcnew.tmp
PCU0
PCU1
PCU2
PCU3
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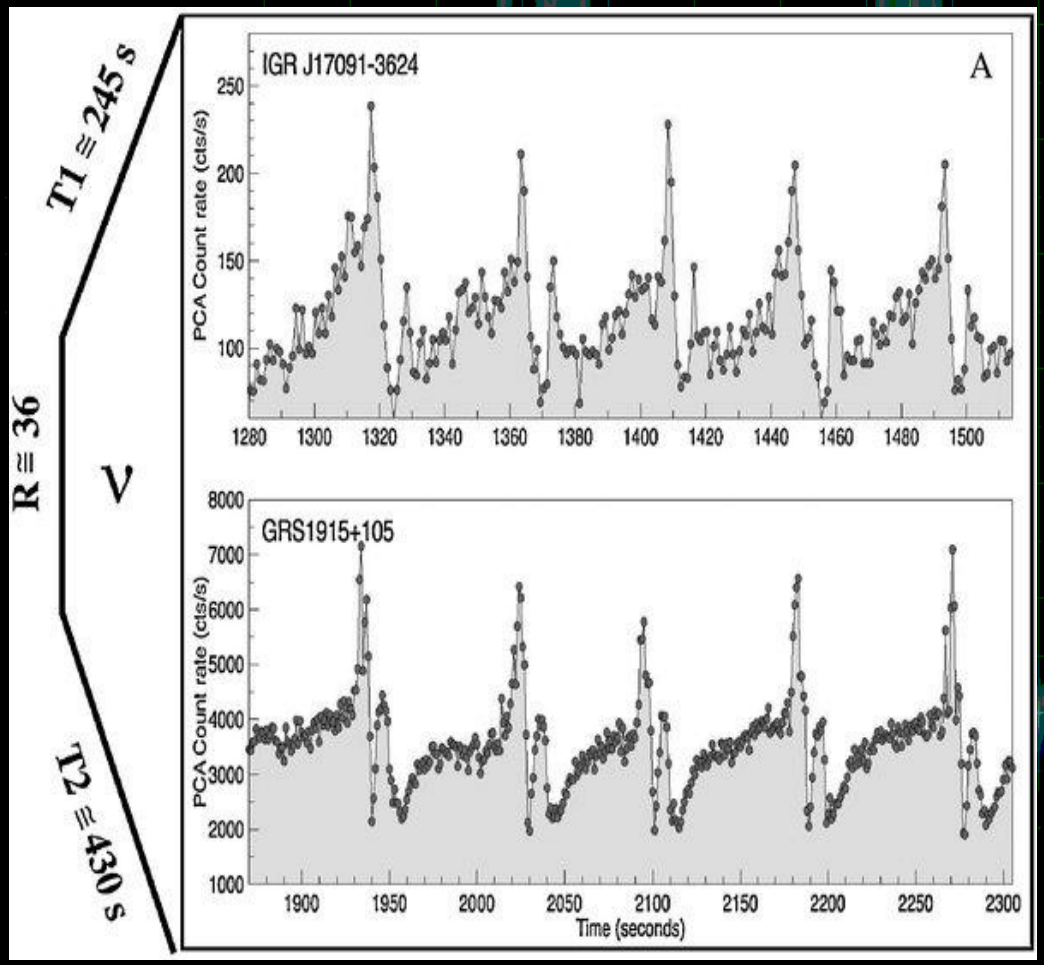
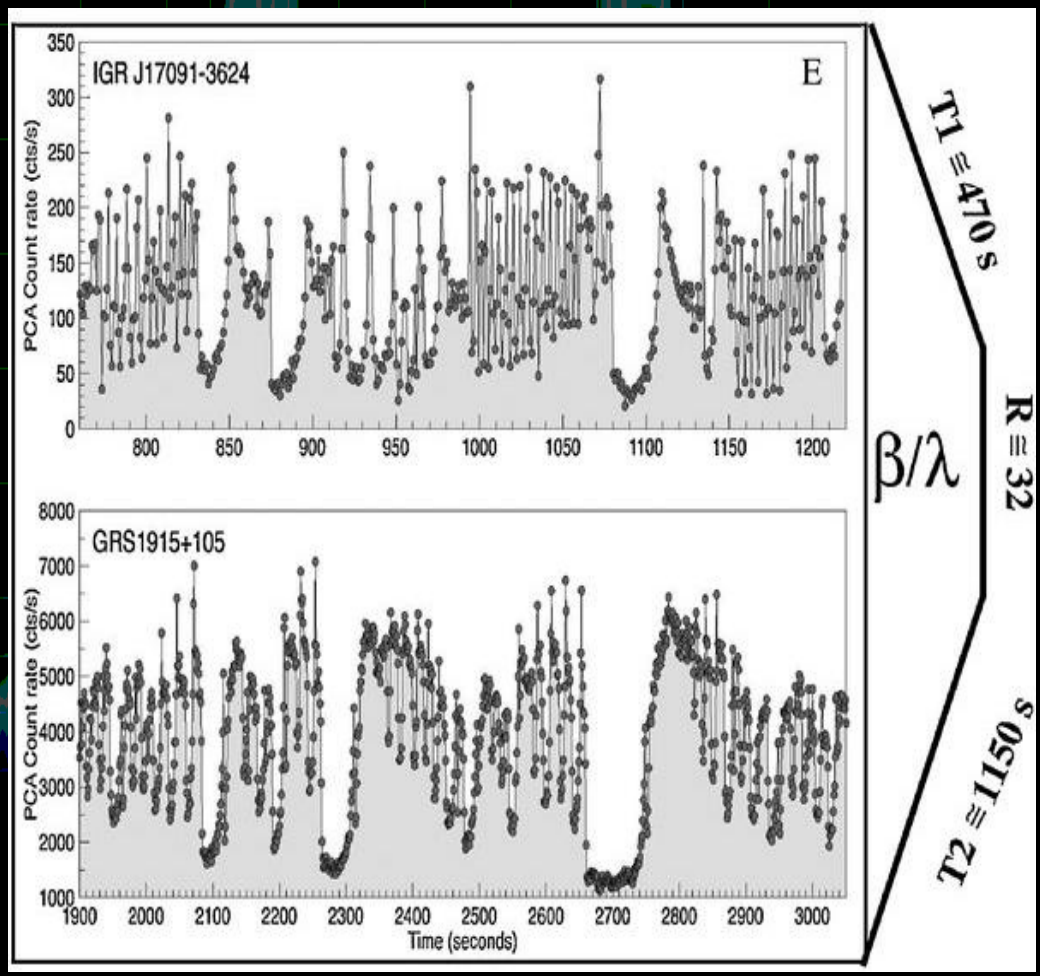
14-Mar-2011 20:39

IGR J17091-3624
the last treasure discovered with RXTE





Altamirano et al. 2011

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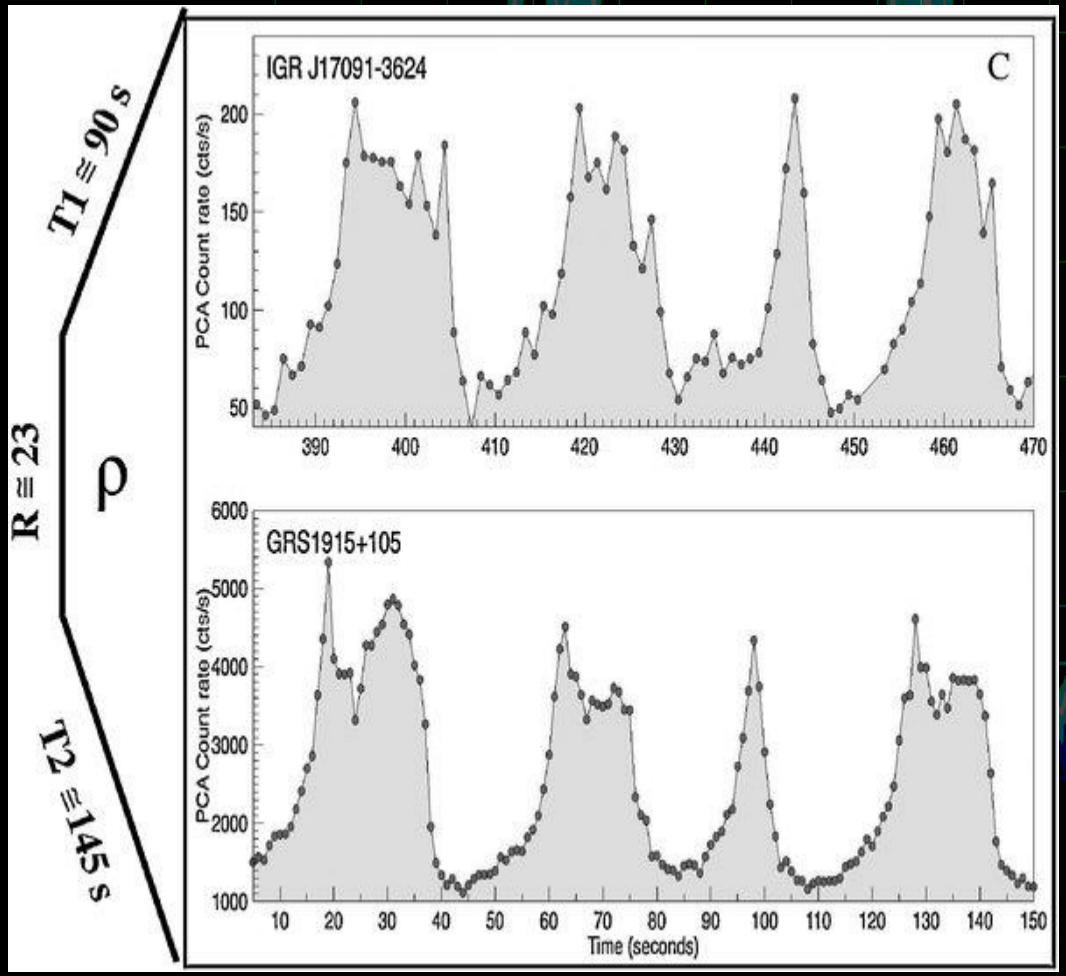

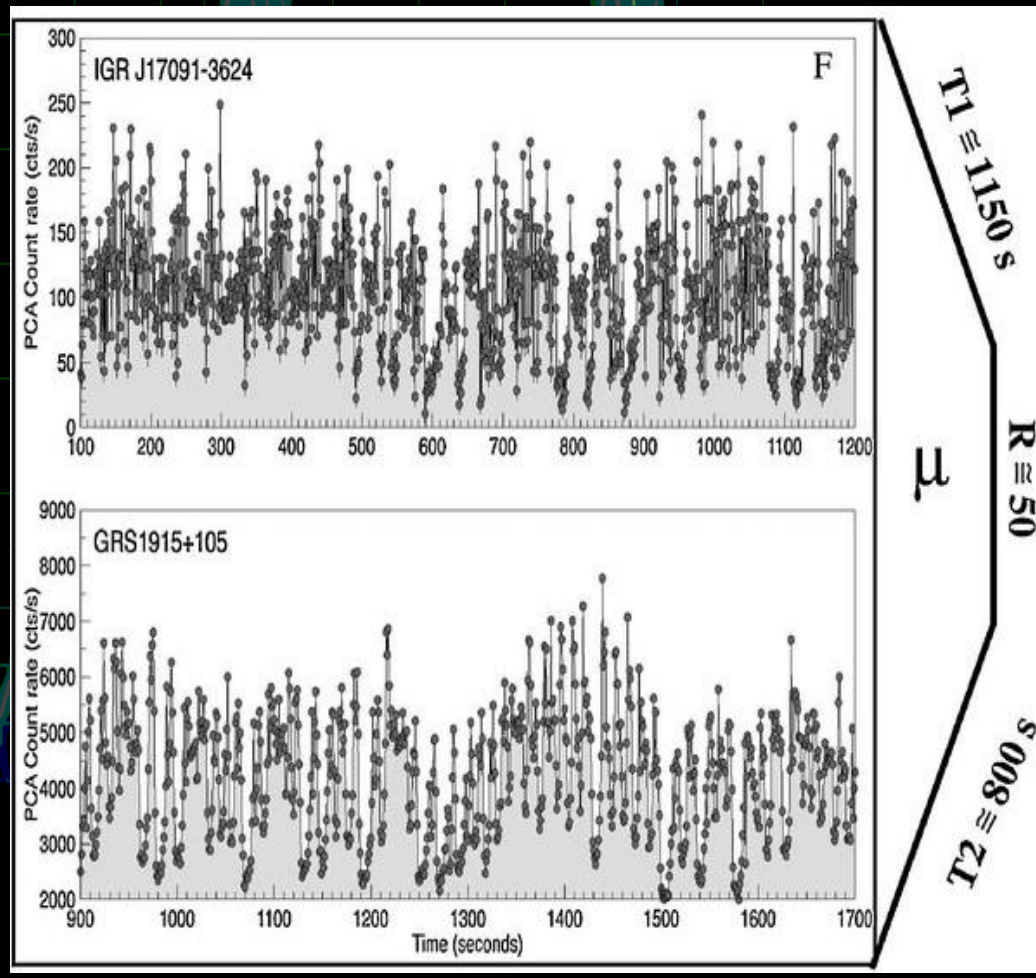

Altamirano et al. 2011

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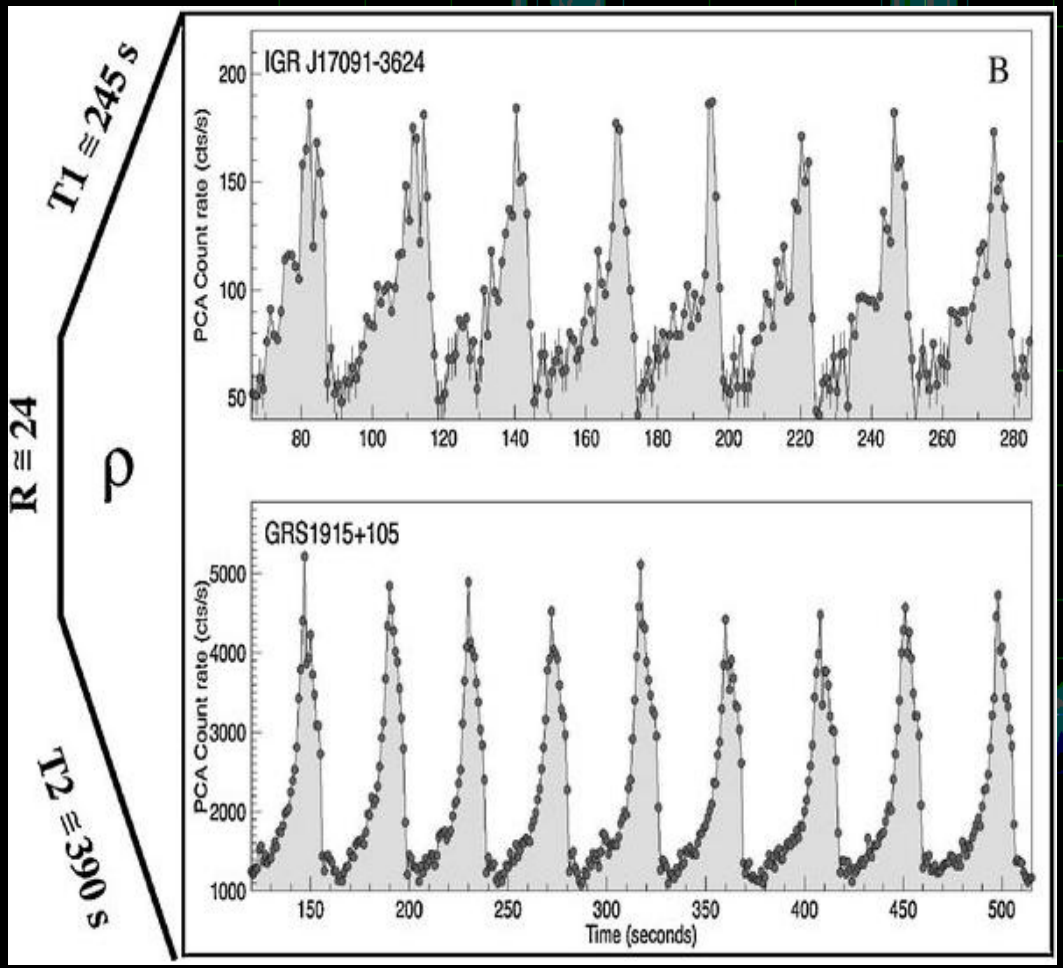

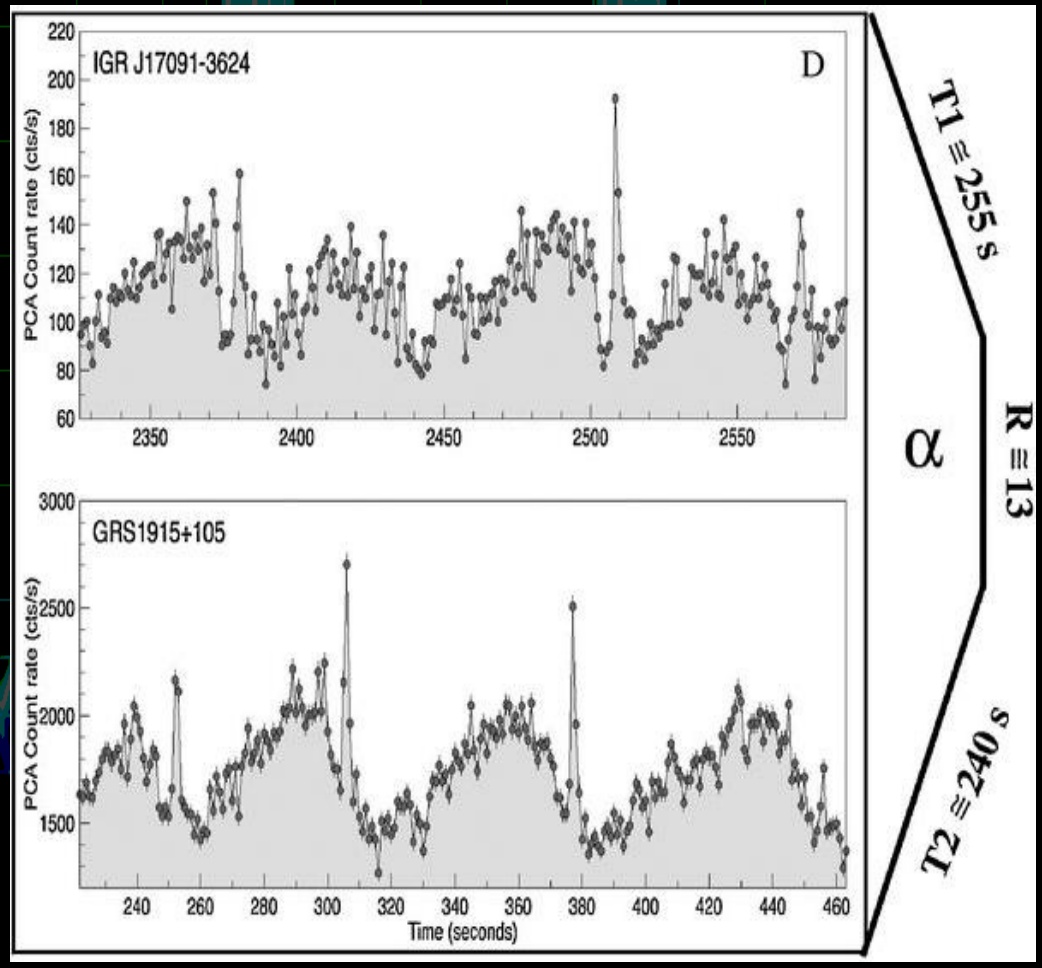

Altamirano et al. 2011

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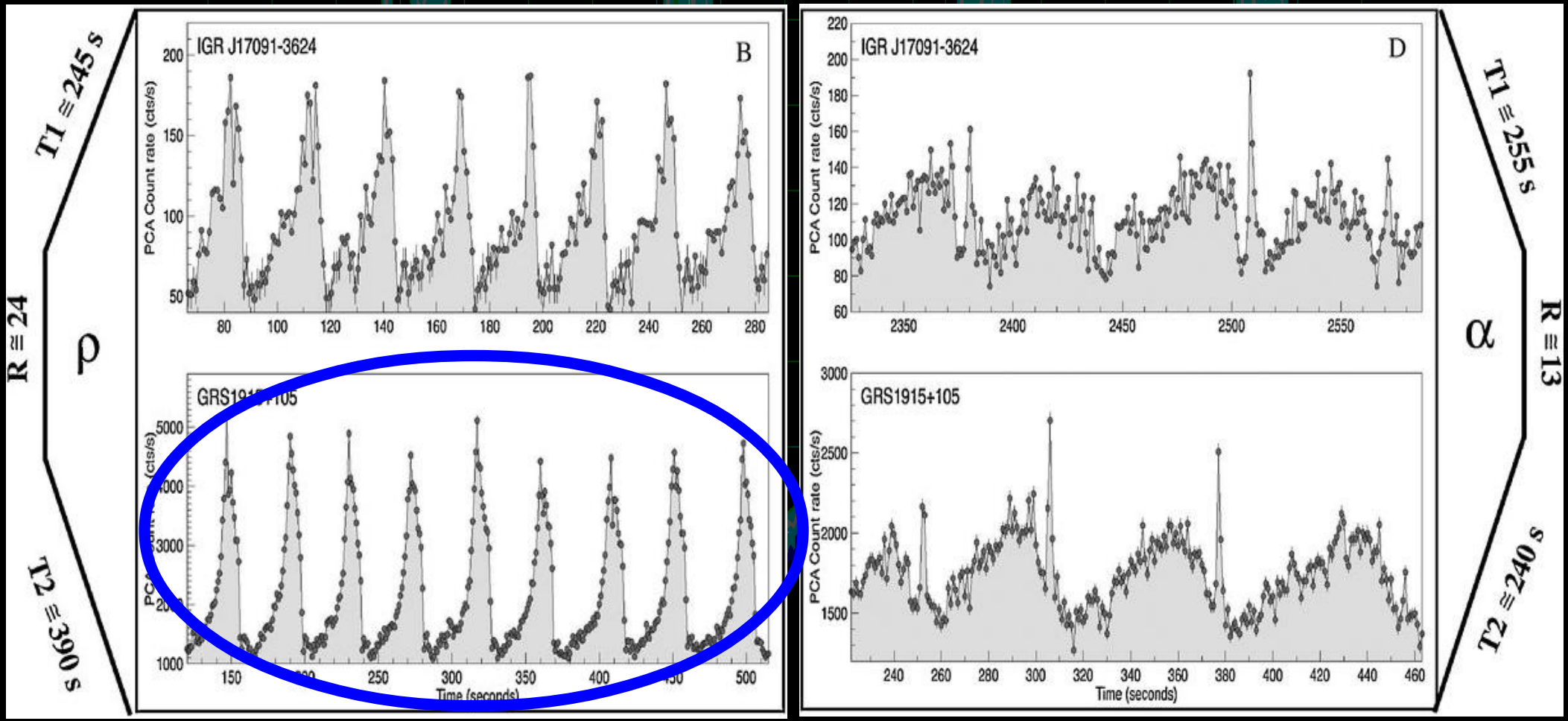
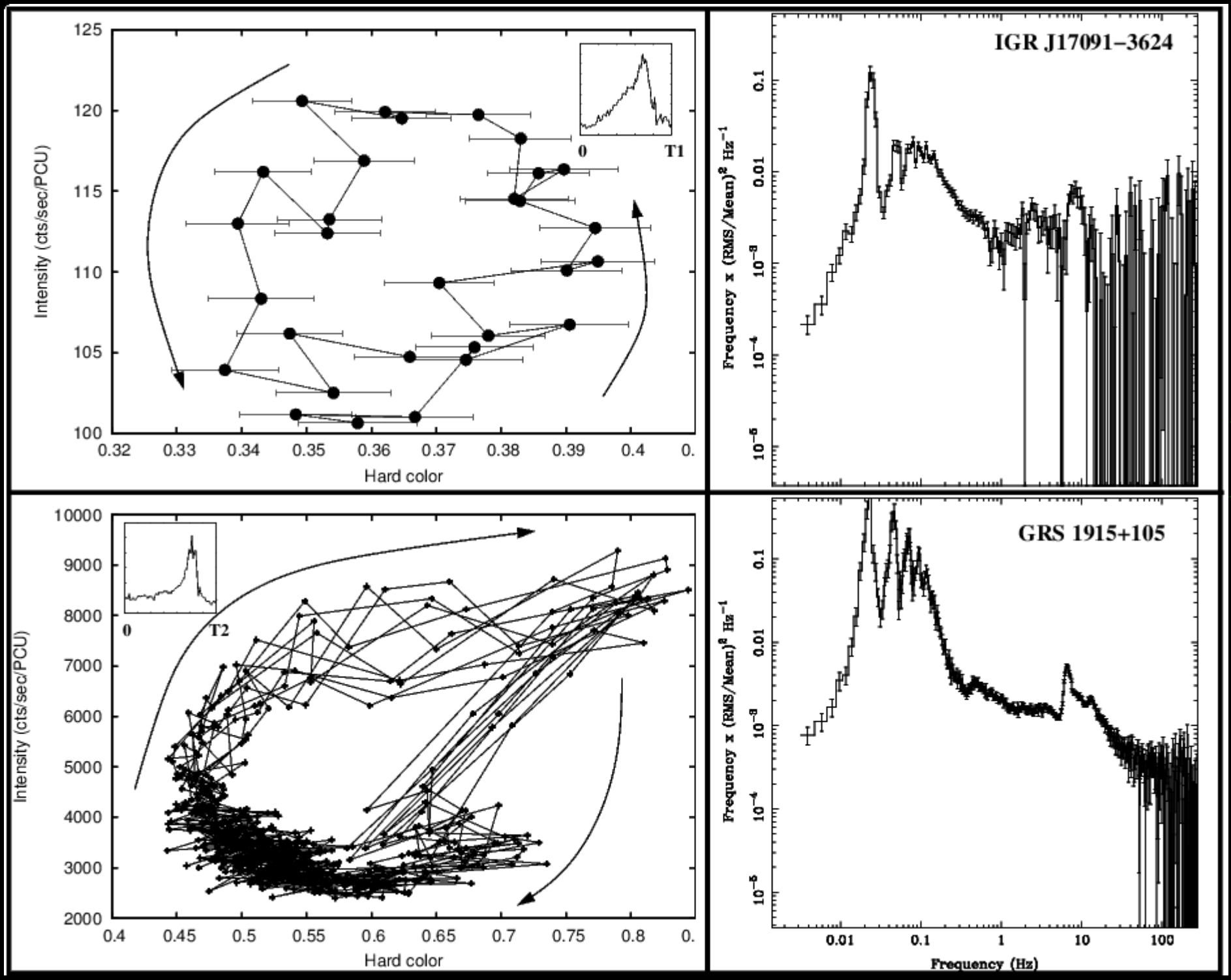
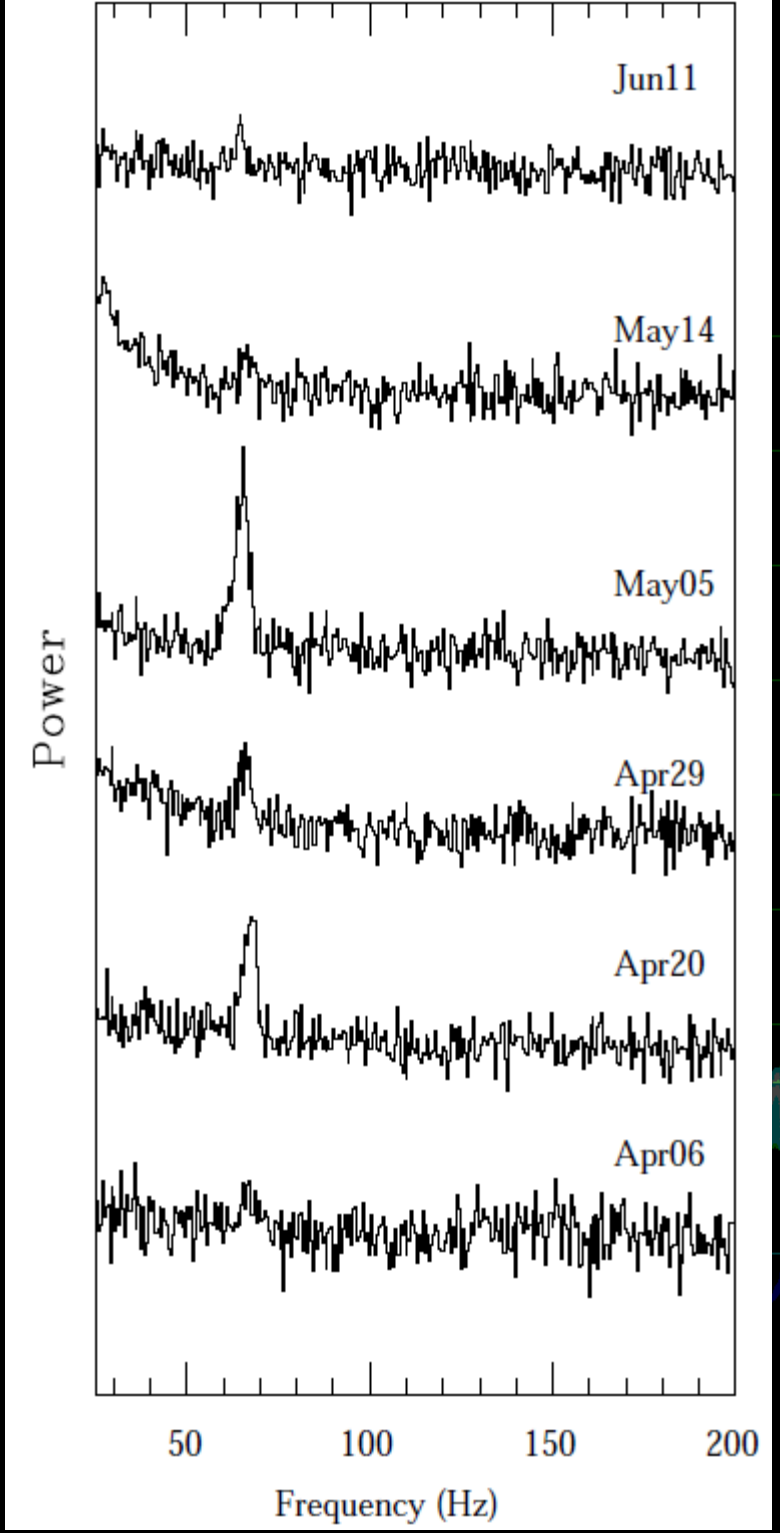


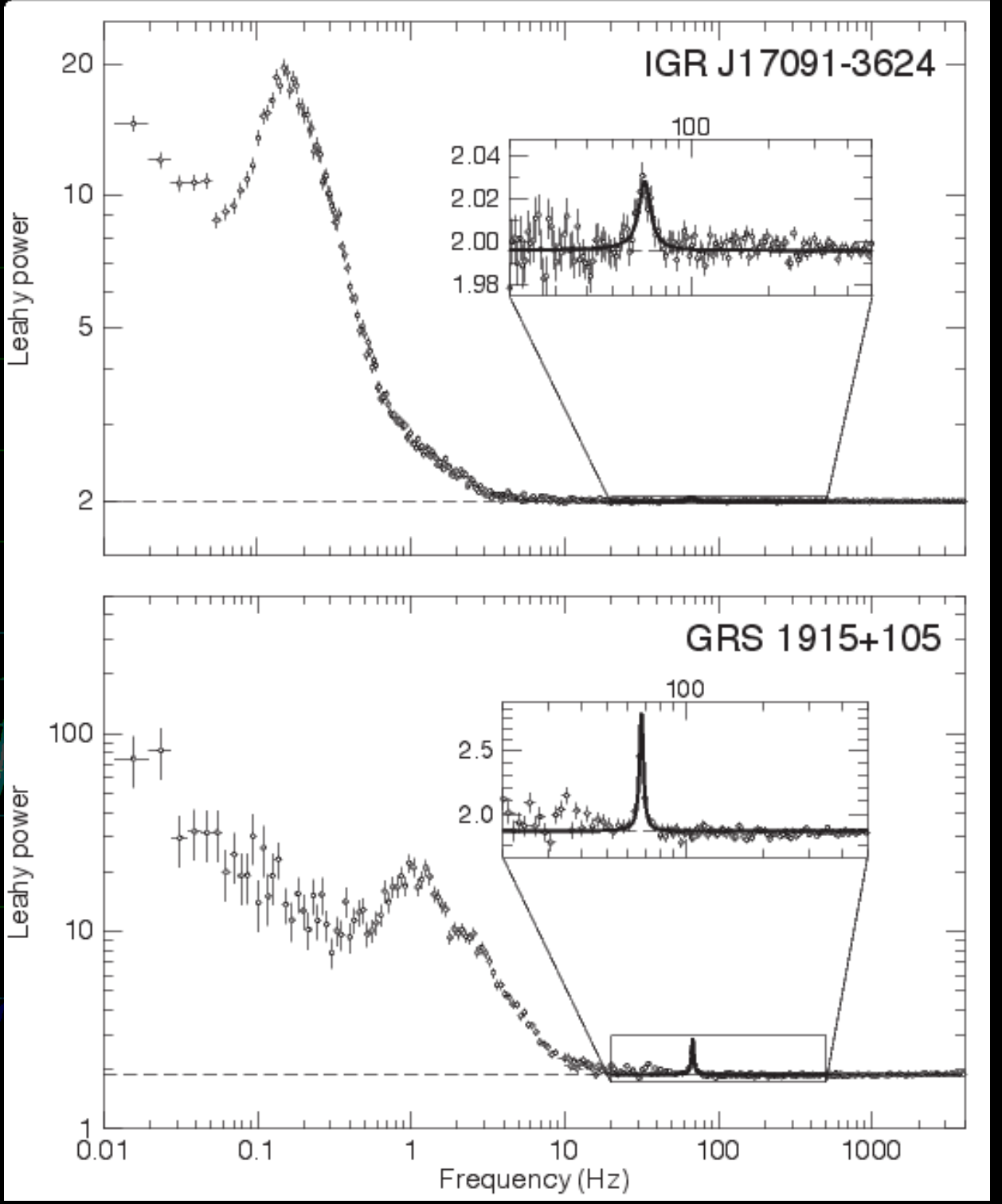
Altamirano et al. 2011



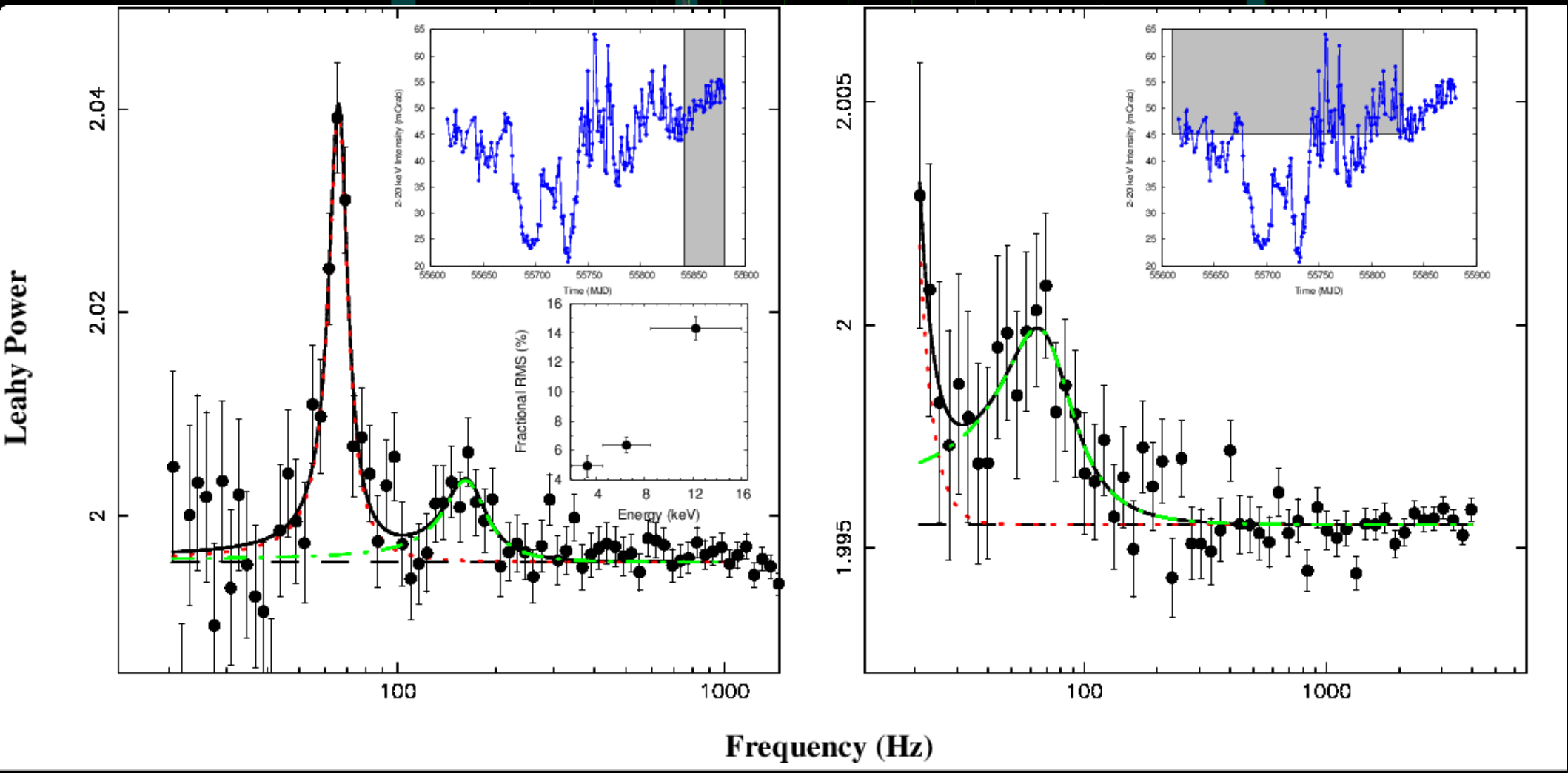
Altamirano et al. 2011



Morgan et al. 1997



Altamirano & Belloni 2012



Frequency (Hz)

Altamirano & Belloni 2012

AN EXTREME X-RAY DISK WIND IN THE BLACK HOLE CANDIDATE IGR J17091−3624

A. L. King[1], J. M. Miller[1], J. Raymond[2], A. C. Fabian[3], C. S. Reynolds[4], T. R. Kallman[5], D. Maitra[1], E. M. Cackett[3,6], and M. P. Rupen[7]

ABSTRACT

Chandra spectroscopy of transient stellar-mass black holes in outburst has clearly revealed accretion disk winds in soft, disk-dominated states, in apparent anti-correlation with relativistic jets in low/hard states. These disk winds are observed to be highly ionized, dense, and to have typical velocities of ∼1000 km s^{-1} or less projected along our line of sight. Here, we present an analysis of two *Chandra* High Energy Transmission Grating spectra of the Galactic black hole candidate IGR J17091−3624 and contemporaneous Expanded Very Large Array (EVLA) radio observations, obtained in 2011. The second *Chandra* observation reveals an absorption line at 6.91 ± 0.01 keV; associating this line with He-like Fe XXV requires a blueshift of 9300^{+500}_{-400} km s^{-1} (0.03*c*, or the escape velocity at 1000 $R_{\rm Schw}$). This projected outflow velocity is an order of magnitude higher than has previously been observed in stellar-mass black holes, and is broadly consistent with some of the fastest winds detected in active galactic nuclei. A potential feature at 7.32 keV, if due to Fe XXVI, would imply a velocity of ∼14,600 km s^{-1} (0.05*c*), but this putative feature is marginal. Photoionization modeling suggests that the accretion disk wind in IGR J17091−3624 may originate within 43,300 Schwarzschild radii of the black hole and may be expelling more gas than it accretes. The contemporaneous EVLA observations strongly indicate that jet activity was indeed quenched at the time of our *Chandra* observations. We discuss the results in the context of disk winds, jets, and basic accretion disk physics in accreting black hole systems.

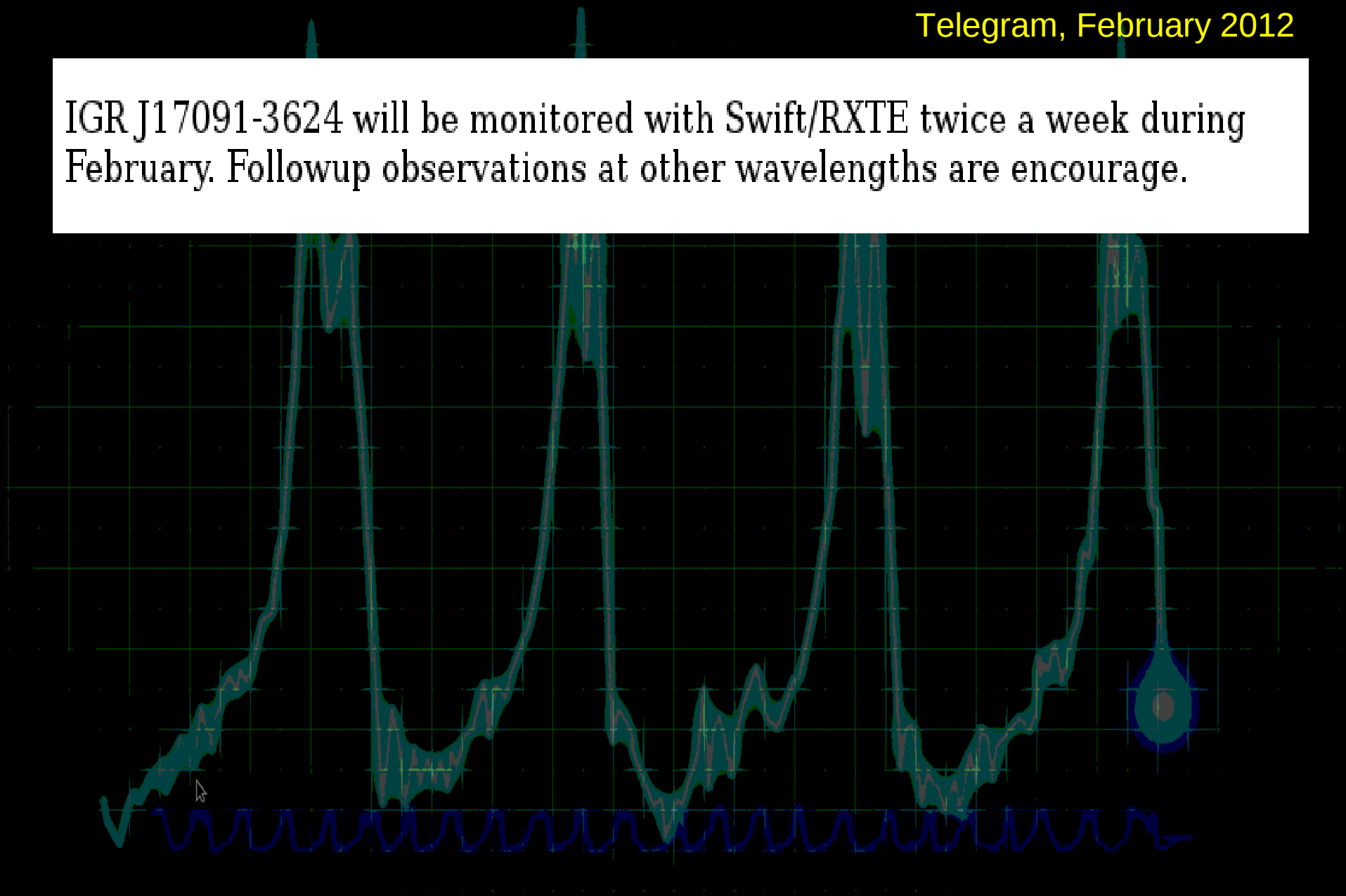
Summary:

- Shows at least 9 of the 12 variability classes identified in GRS 1915+105
- Heartbeats and others can be faster (~2 sec period vs 40 sec min in GRS1915)
- Power spectra are very similar
- Both show high-frequency QPOs at ~67 Hz.
- HID of the Heartbeats in the wrong way?
- More than one order of magnitude difference in 2-20 keV average flux
- IGR J17091 winds ~10 faster than any other galactic black hole
- Under-luminous in Radio or in X-rays --> doesn't follow the L_R-L_X

No idea about the distance, companion or the orbital period of the system

Telegram, February 2012

IGR J17091-3624 will be monitored with Swift/RXTE twice a week during February. Followup observations at other wavelengths are encourage.



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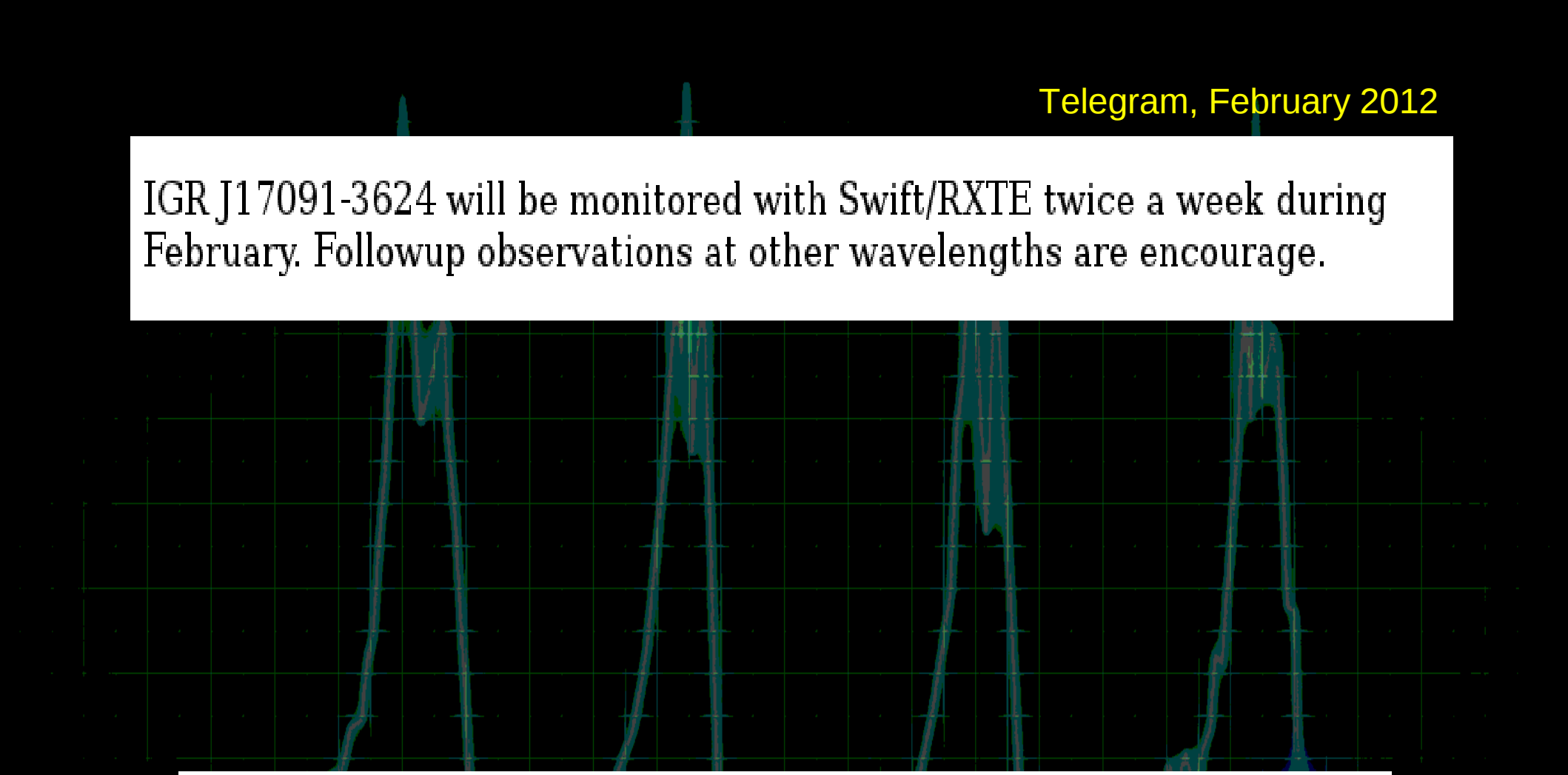
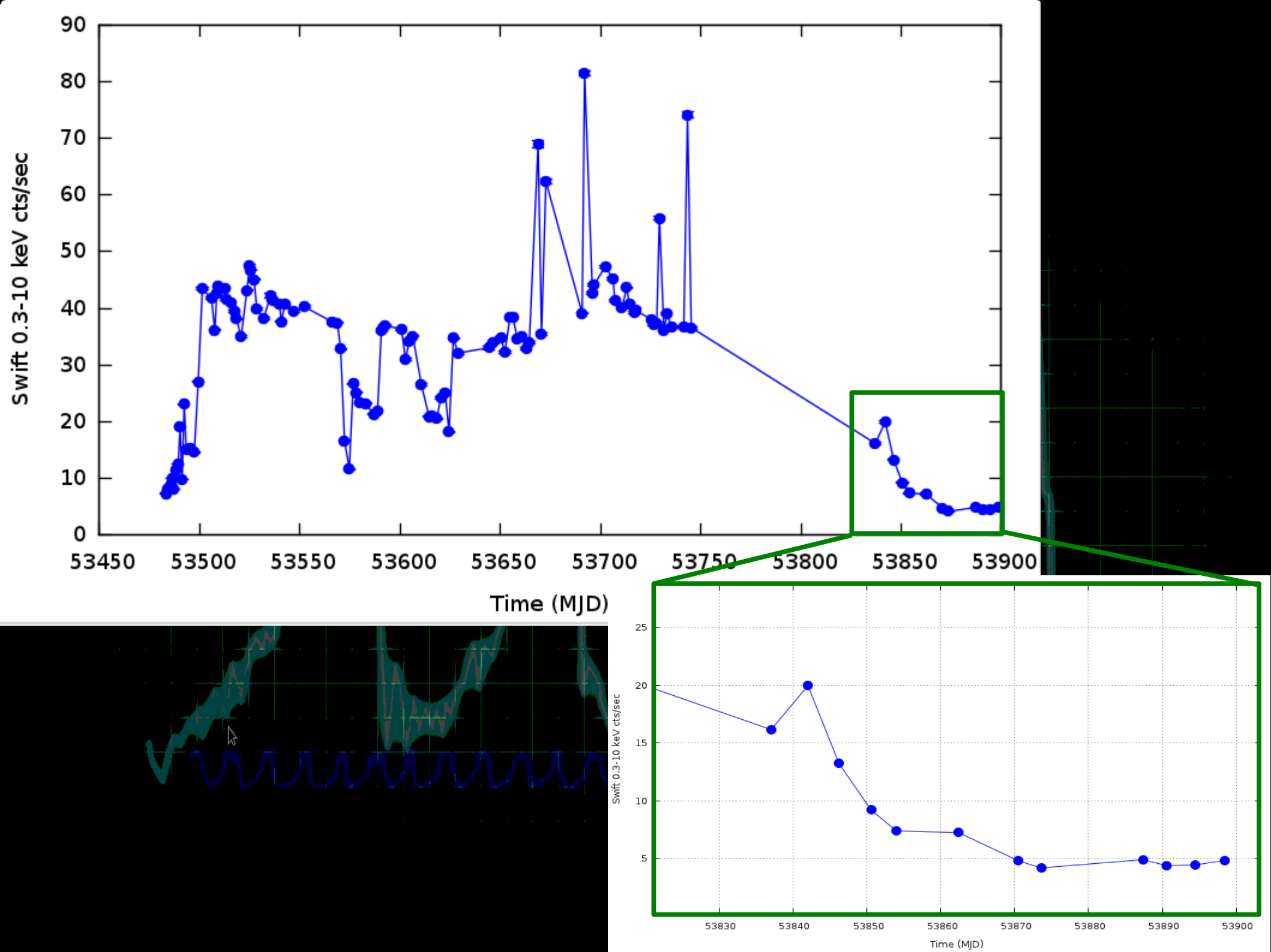


ago. More observations of these stars, to be made with current and future X-ray satellites such as NASA's Rossi X-ray Timing Observer, will put Tauris's picture to the test.

PR on AMXPs, February 2012


Thanks!
Jean!
Tod!
Evans!
Craig!
Divya!
All RXTE Team!


Swift 0.3-10 keV cts/sec
Time (MJD)
0
10
20
30
40
50
60
70
80
90
53450
53500
53550
53600
53650
53700
53750
53800
53850
53900
Swift 0.3-10 keV cts/sec
Time (MJD)
5
10
15
20
25
53830
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