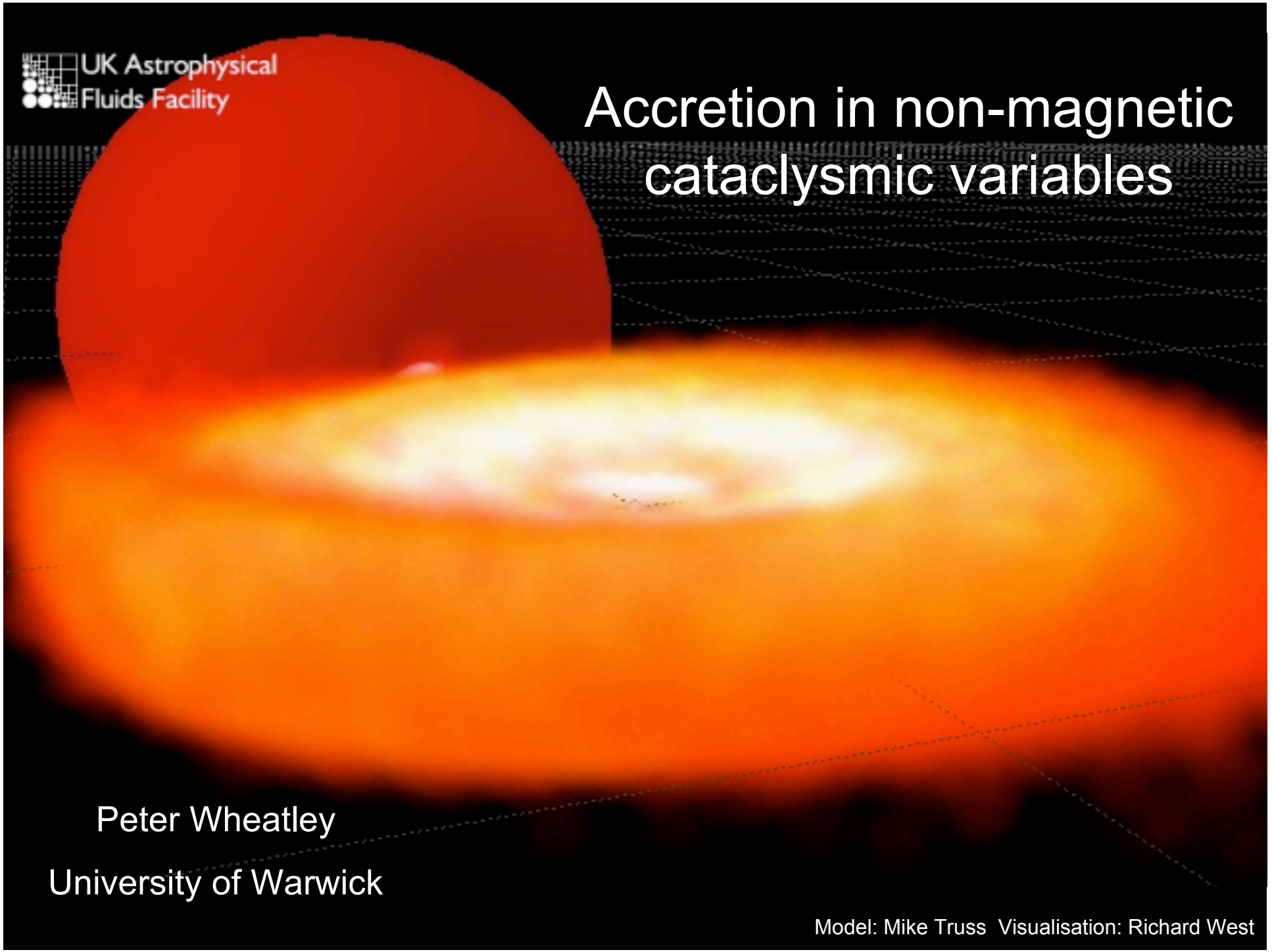
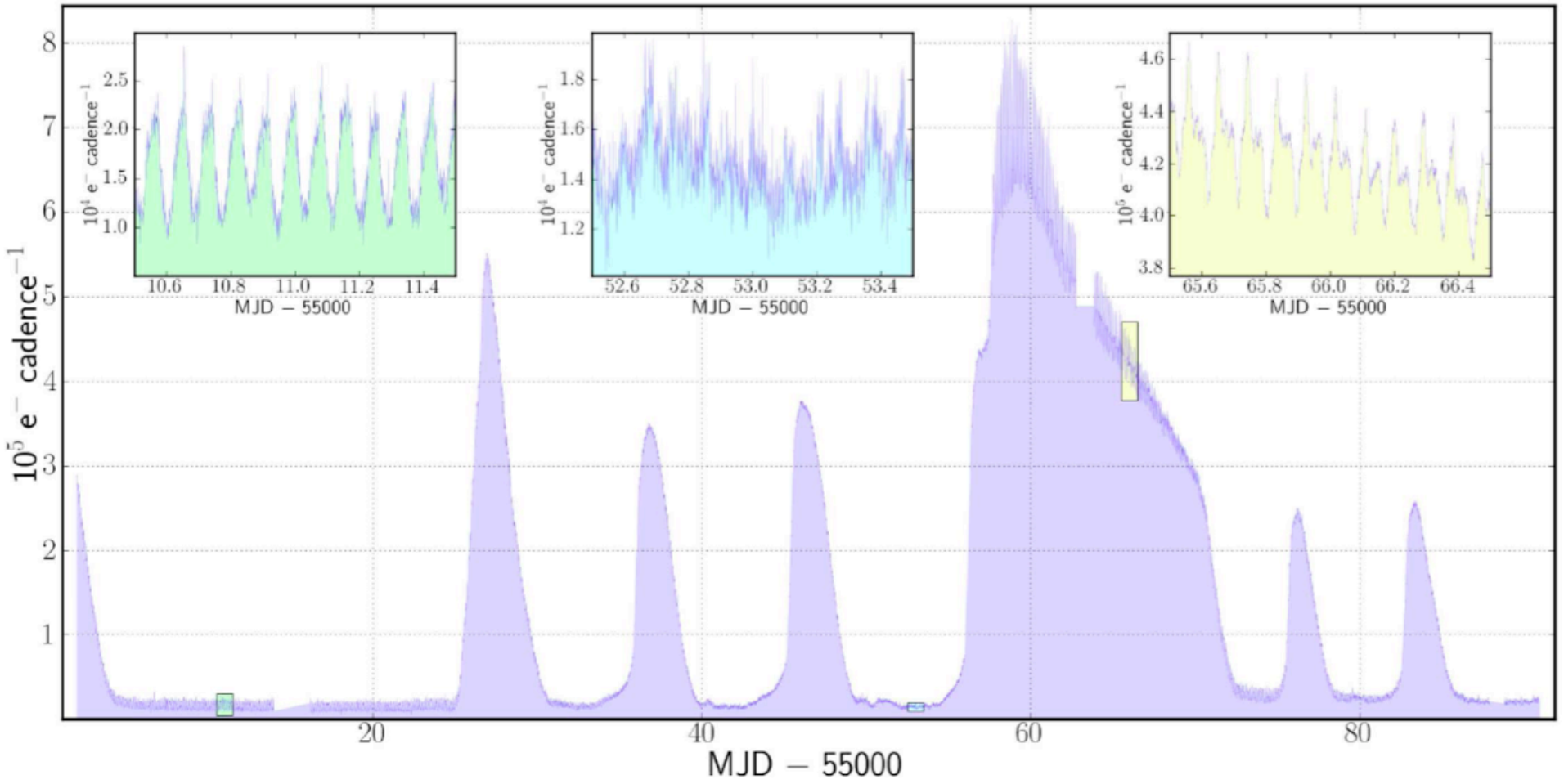
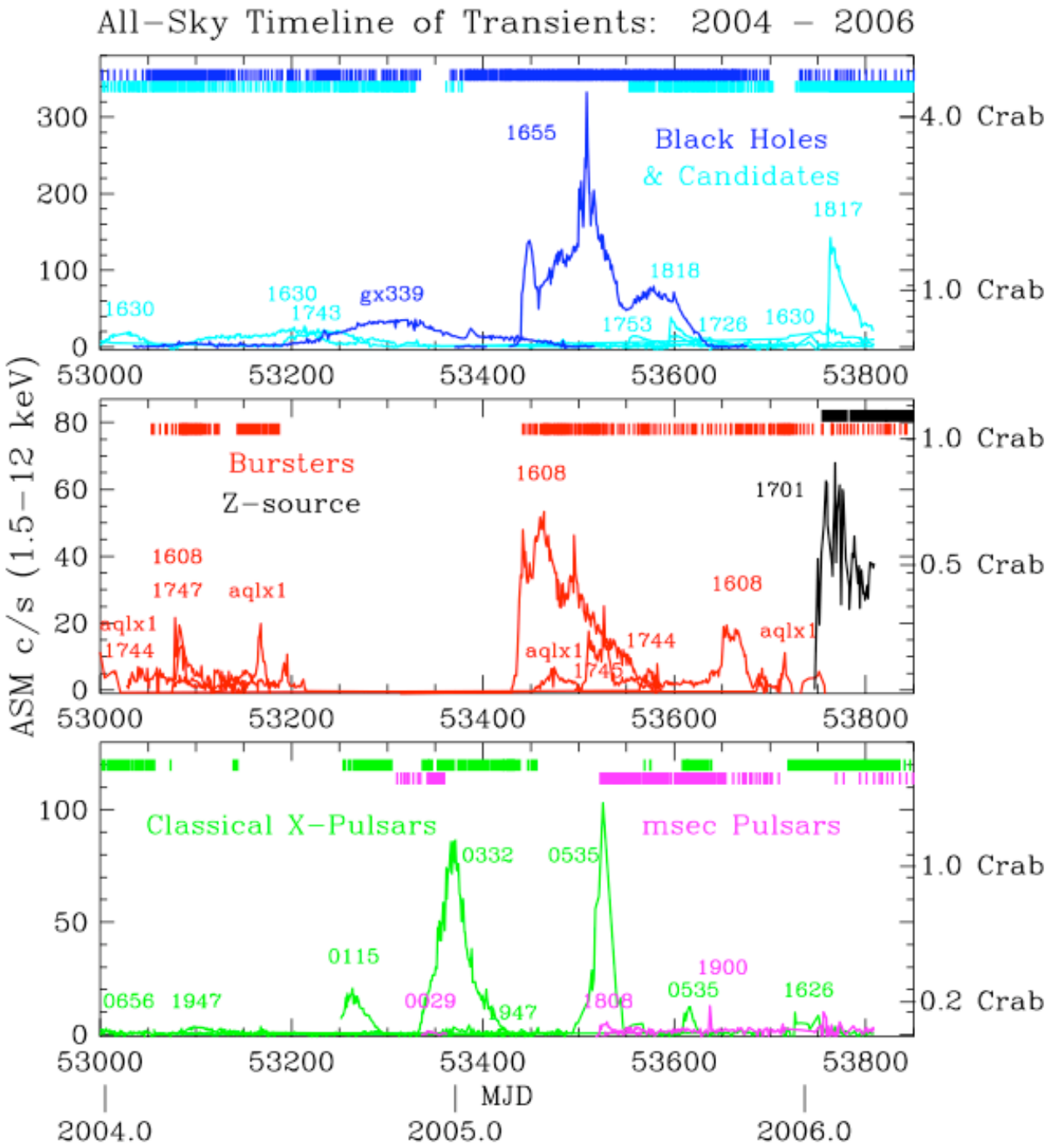

UK Astrophysical
Fluids Facility
Accretion in non-magnetic cataclysmic variables
Peter Wheatley
University of Warwick
Model: Mike Truss Visualisation: Richard West

Kepler GO highlight

V344 Lyr

Still et al 2010



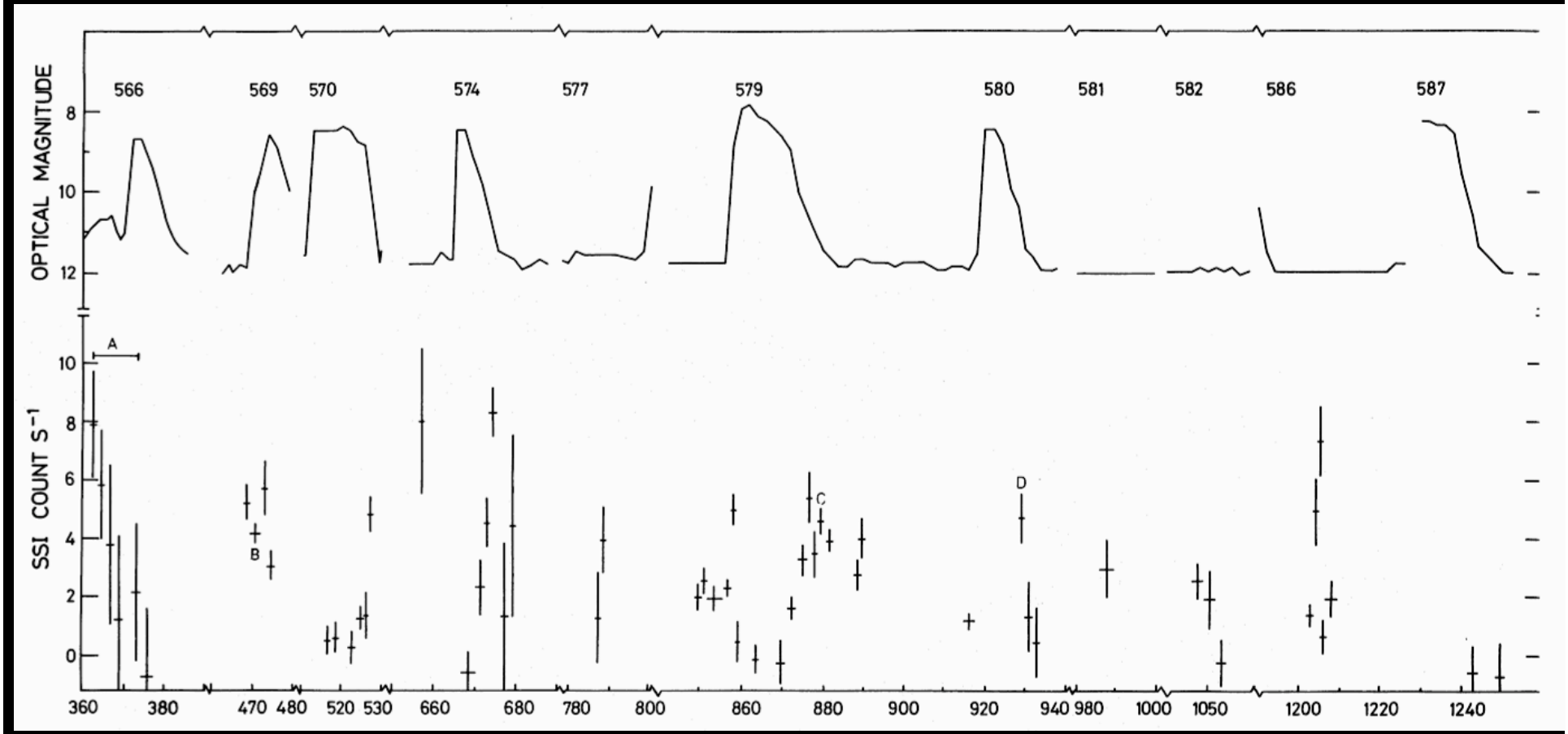


X-ray transients

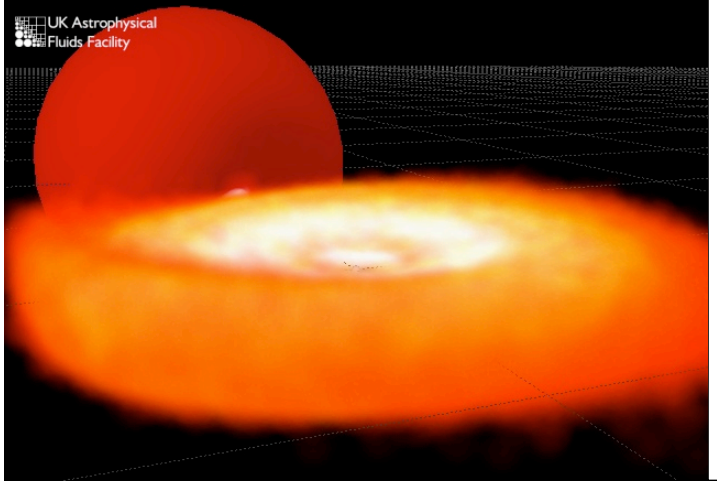
RXTE ASM
Remillard et al 2009

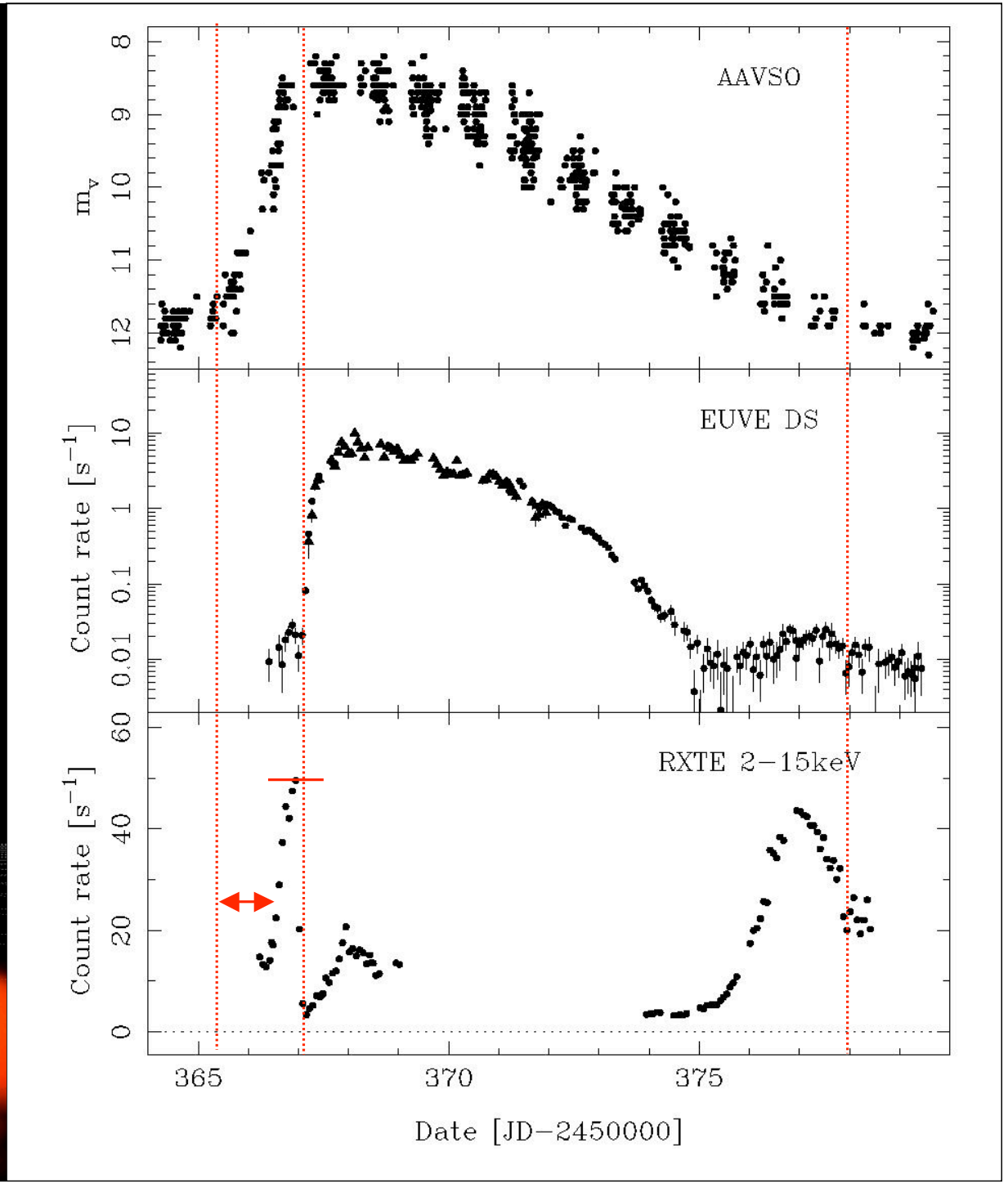
SS Cyg with Ariel V

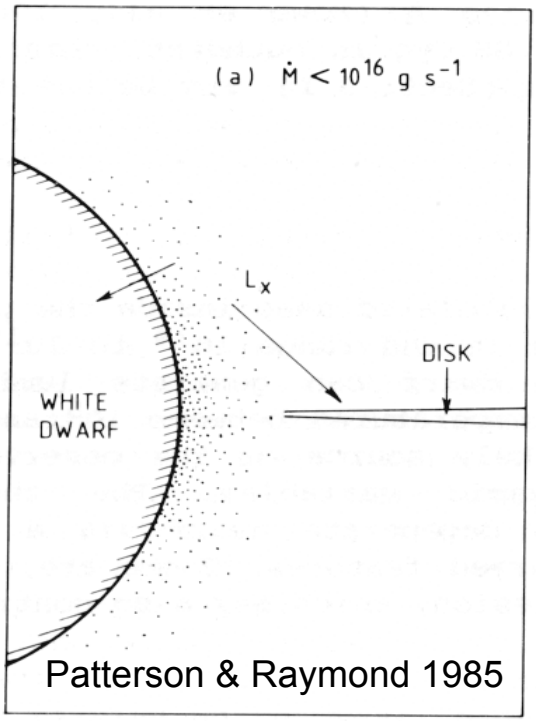
Ricketts, King & Raine 1979



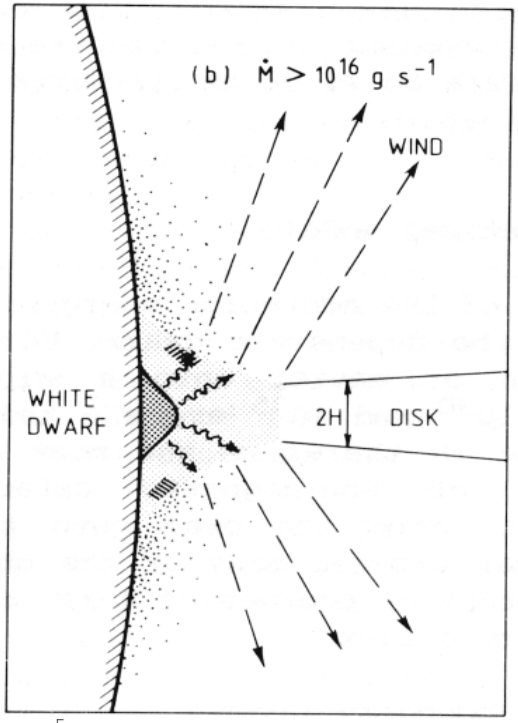
Wheatley, Mauche & Mattei
2003



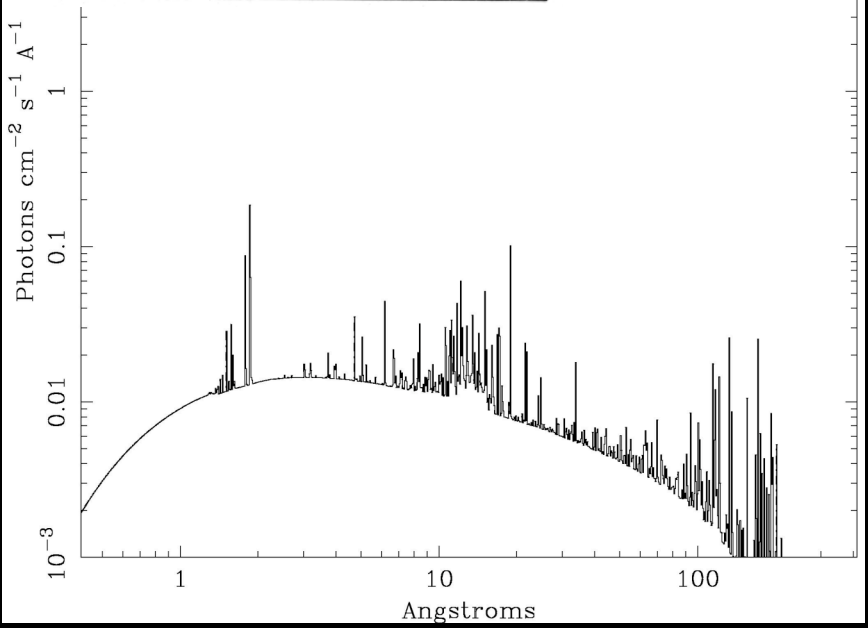




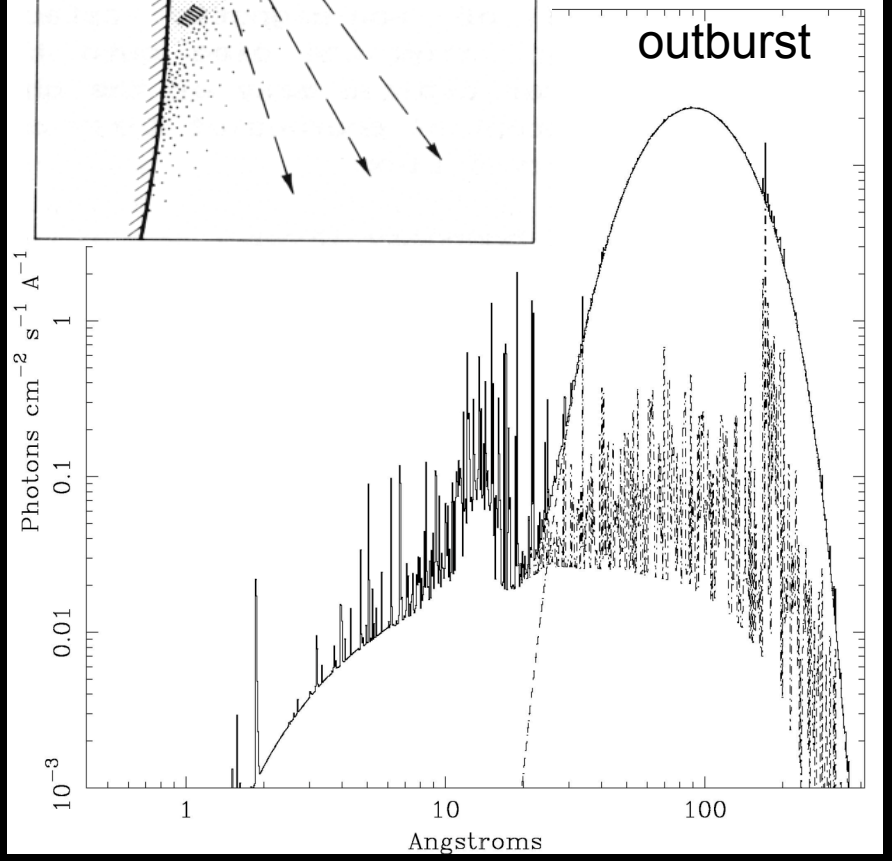
Patterson & Raymond 1985



quiescence

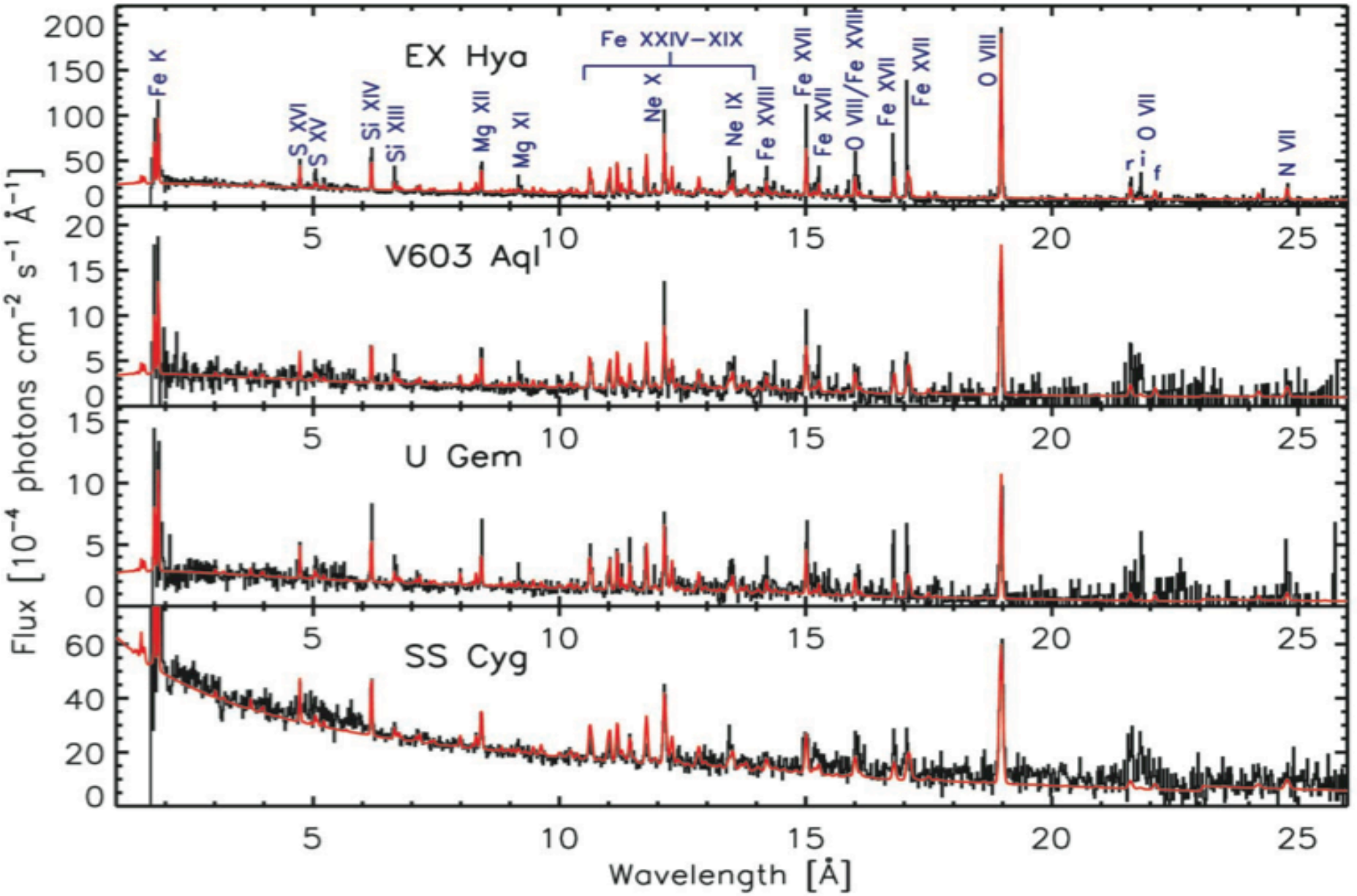


outburst



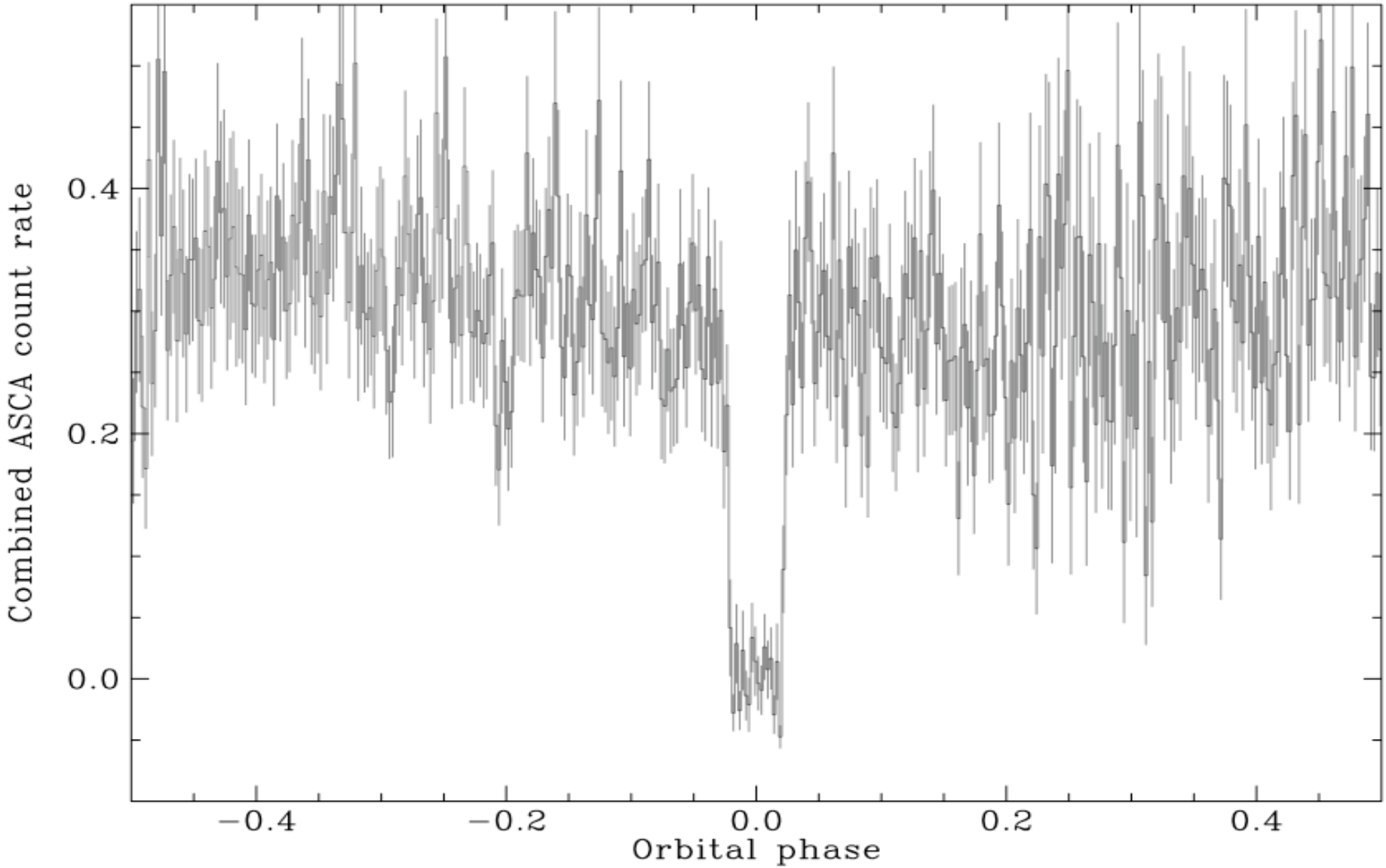
Chandra HETG spectra

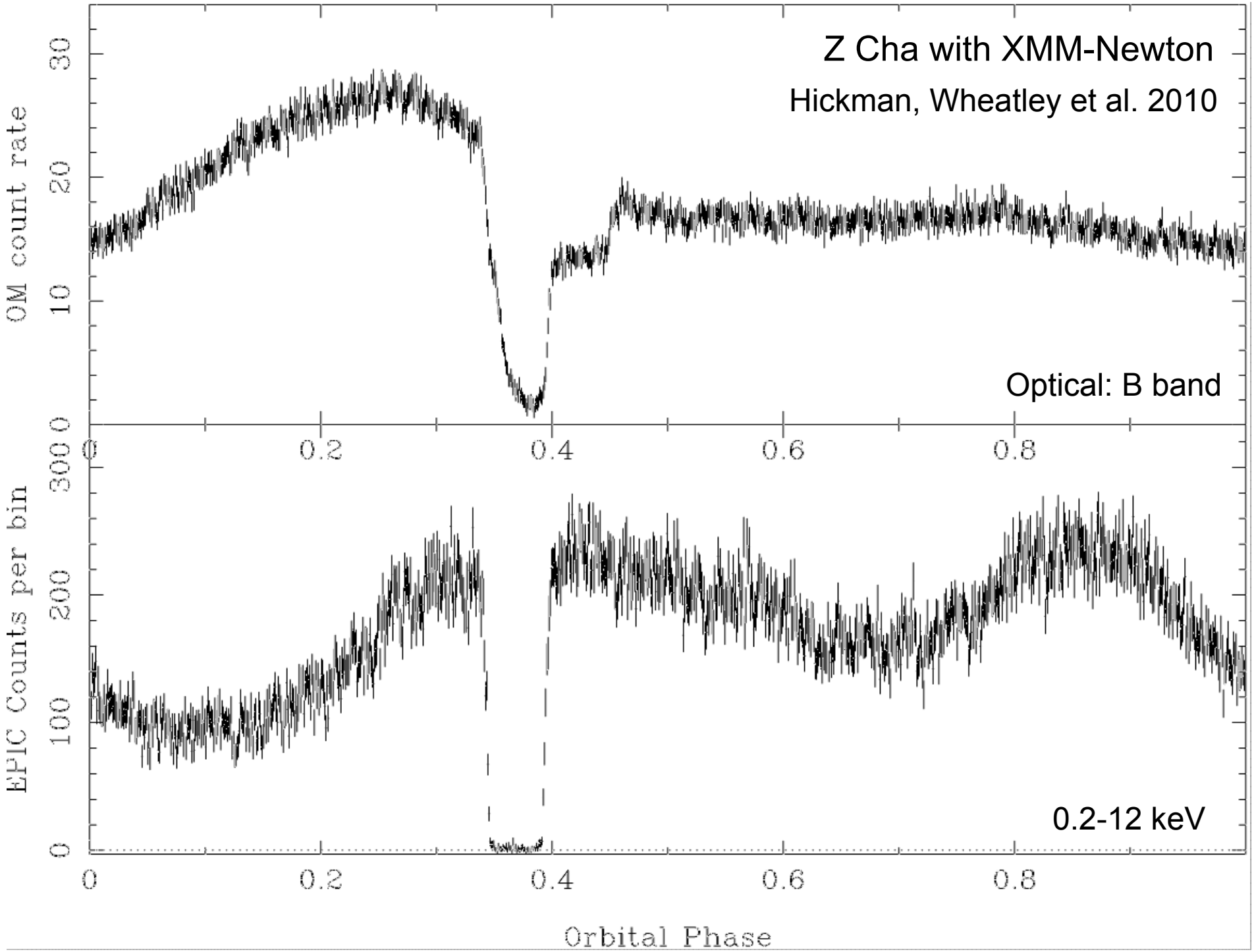
Mukai et al., 2003



HT Cas eclipse with ASCA

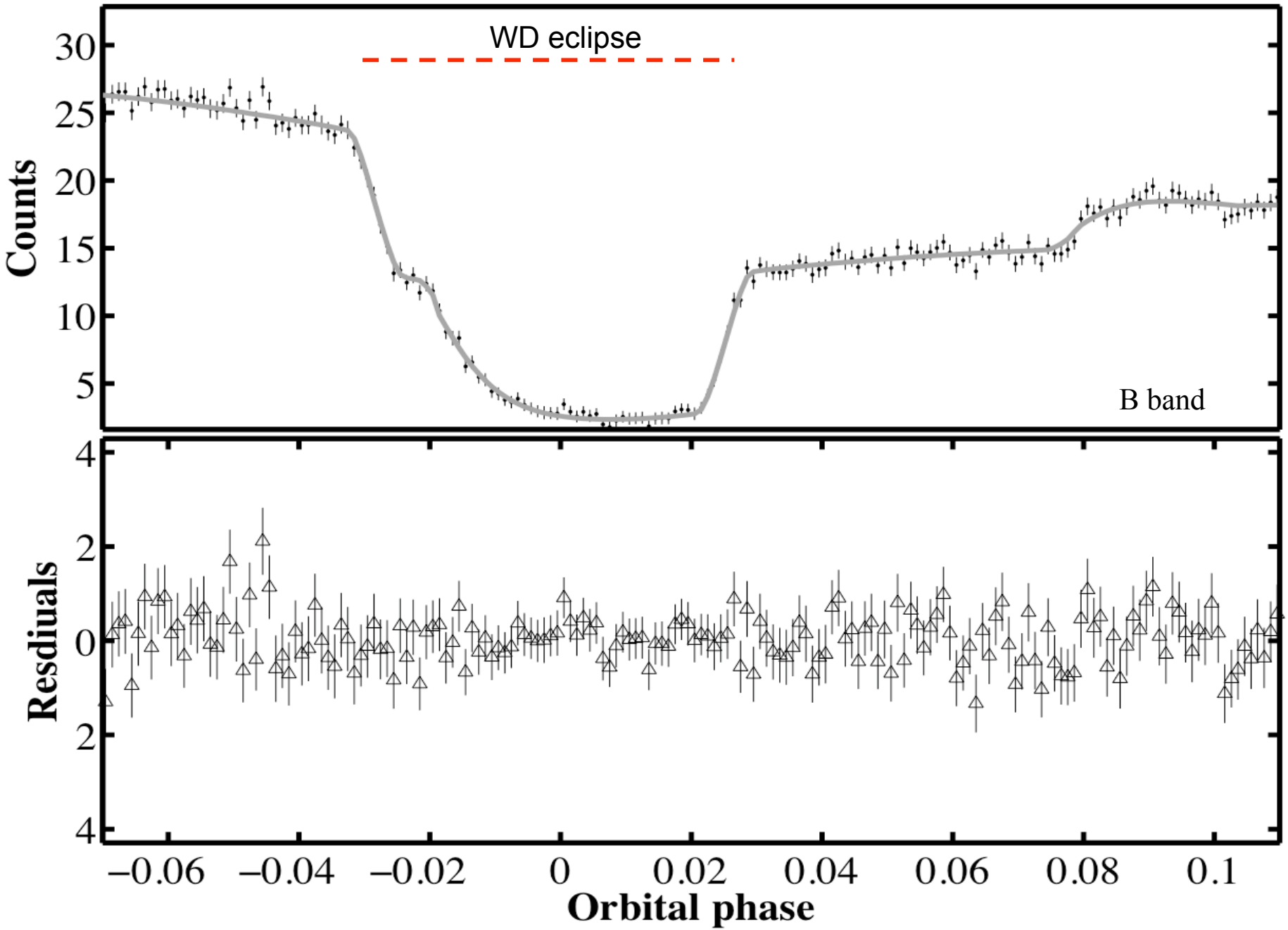
Mukai et al., 1997

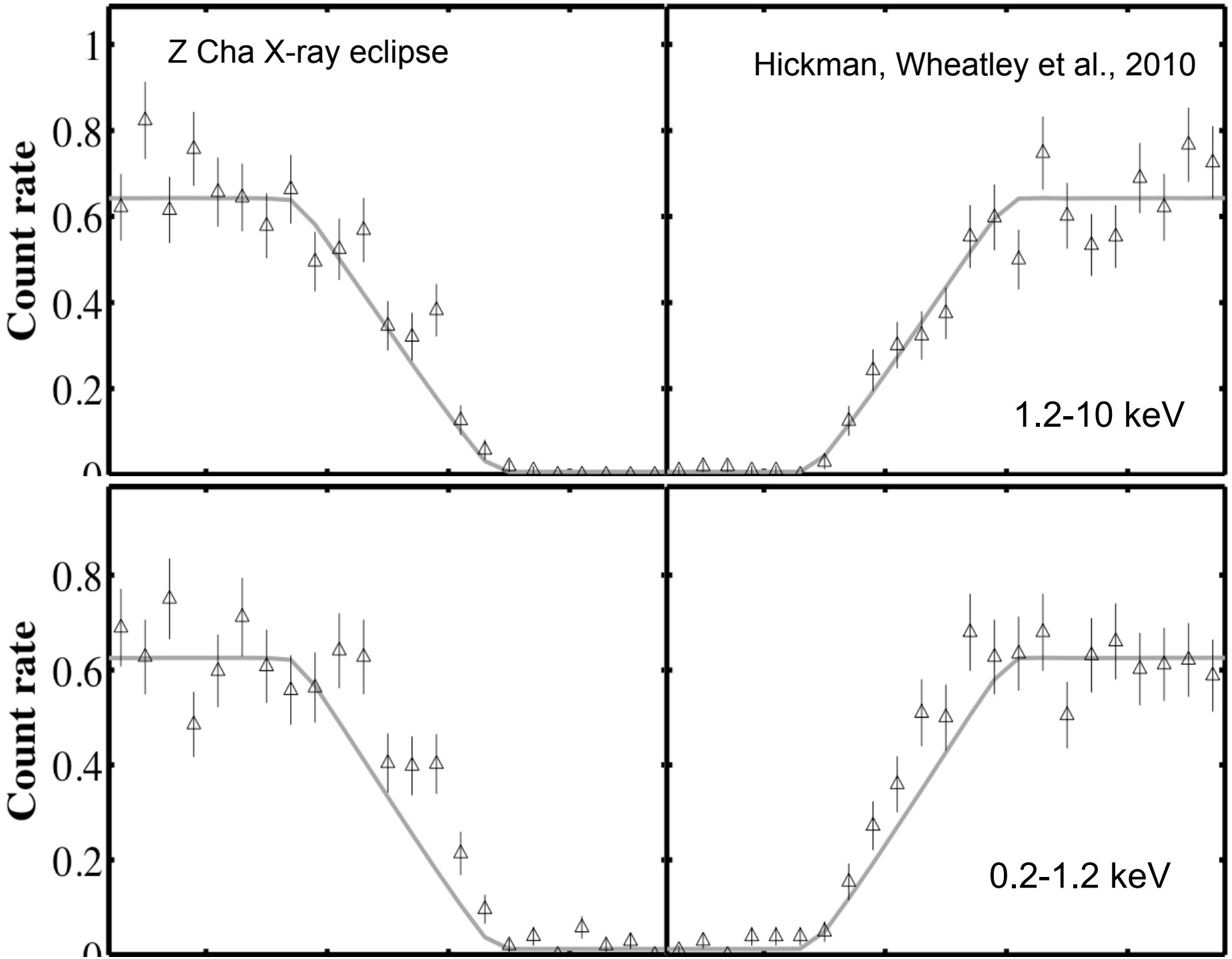


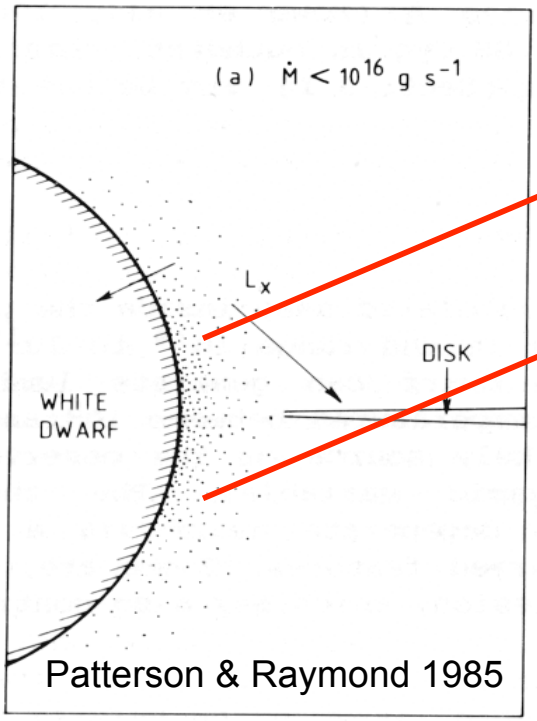

Z Cha with XMM-Newton
Hickman, Wheatley et al. 2010
OM count rate
Optical: B band
EPIC Counts per bin
0.2-12 keV
Orbital Phase
0
10
20
30
100
200
300
0.2
0.4
0.6
0.8

Z Cha optical eclipse

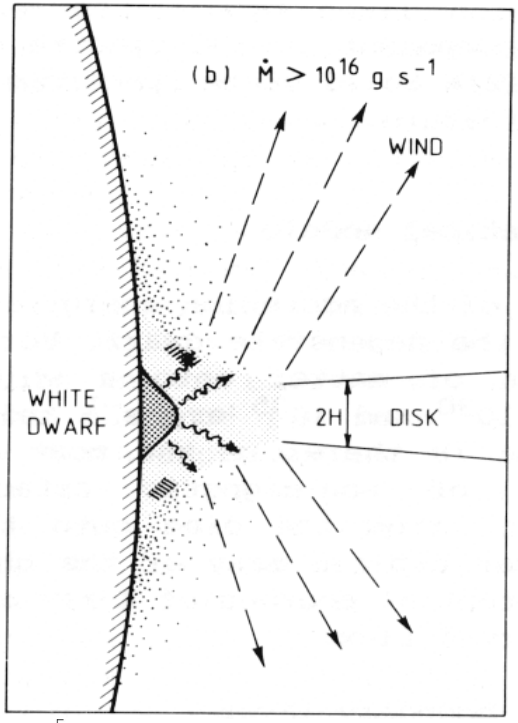
Hickman, Wheatley et al. 2010



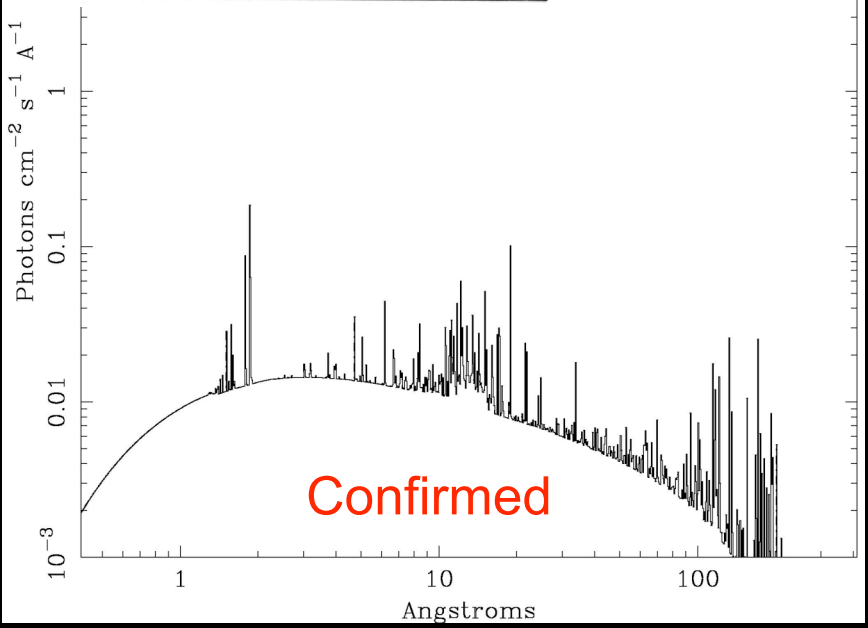

Z Cha X-ray eclipse
Hickman, Wheatley et al., 2010
1.2-10 keV
0.2-1.2 keV
Count rate
Count rate
0
0.2
0.4
0.6
0.8
1



Patterson & Raymond 1985

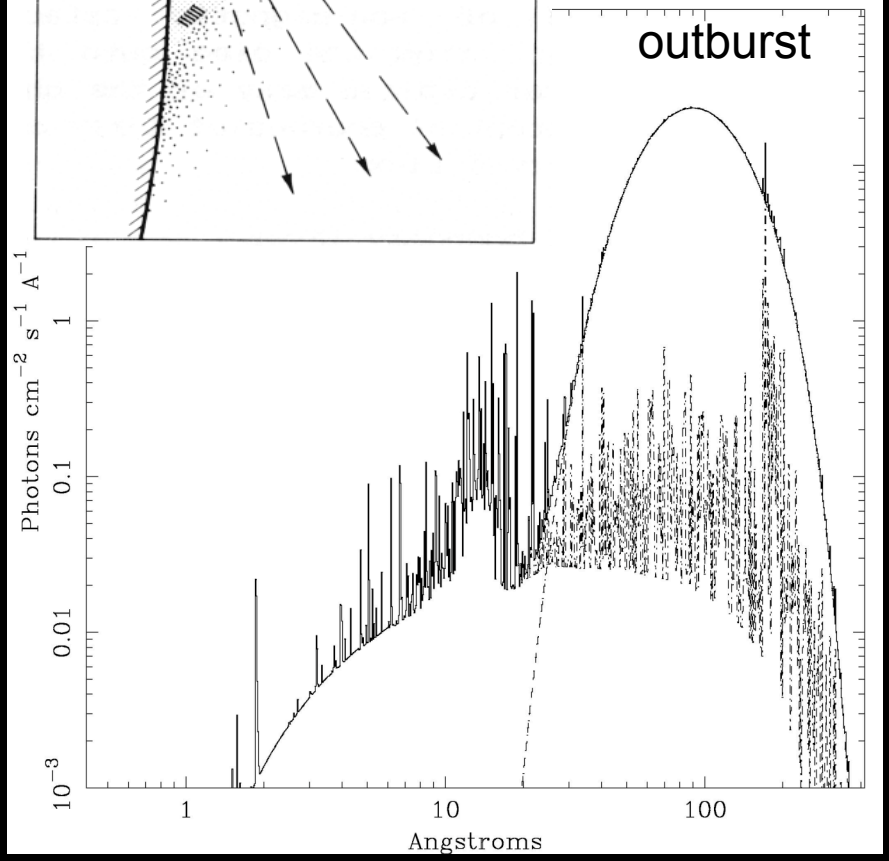


quiescence



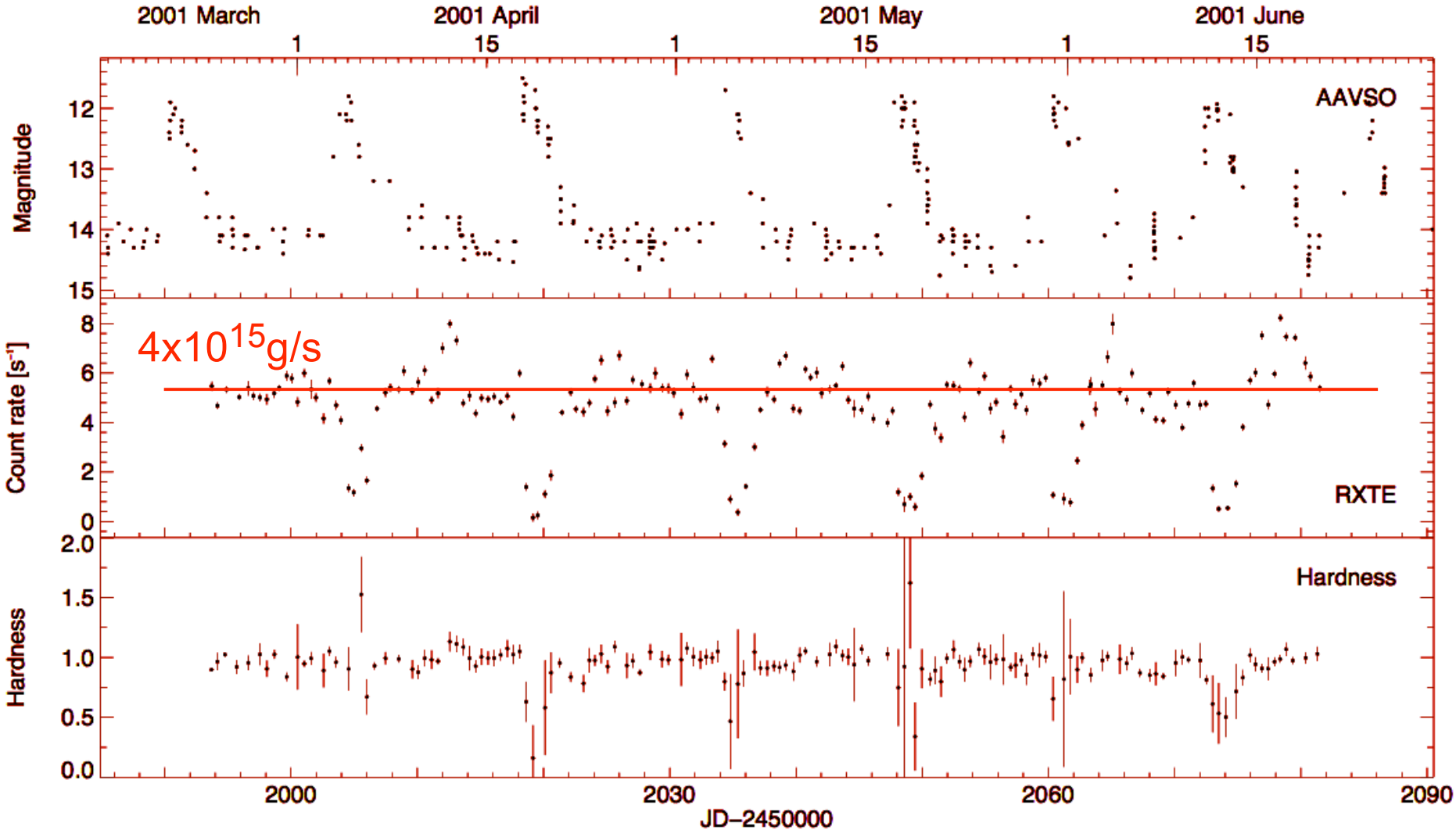
Confirmed

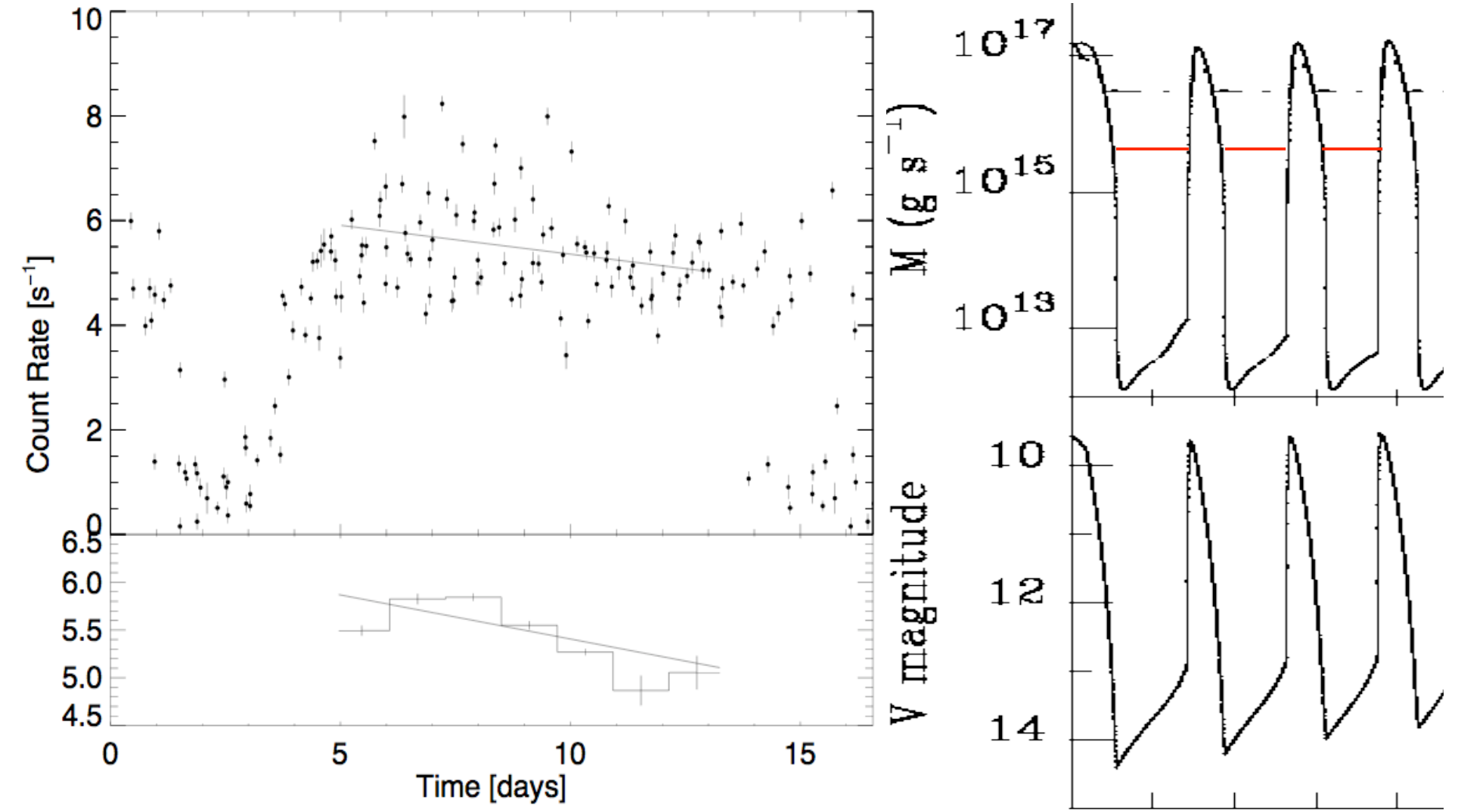
outburst



SU UMa

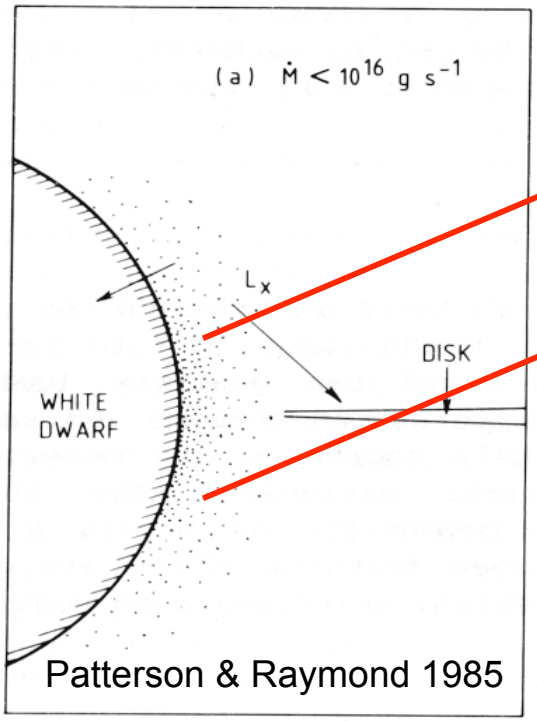
Collins & Wheatley 2009



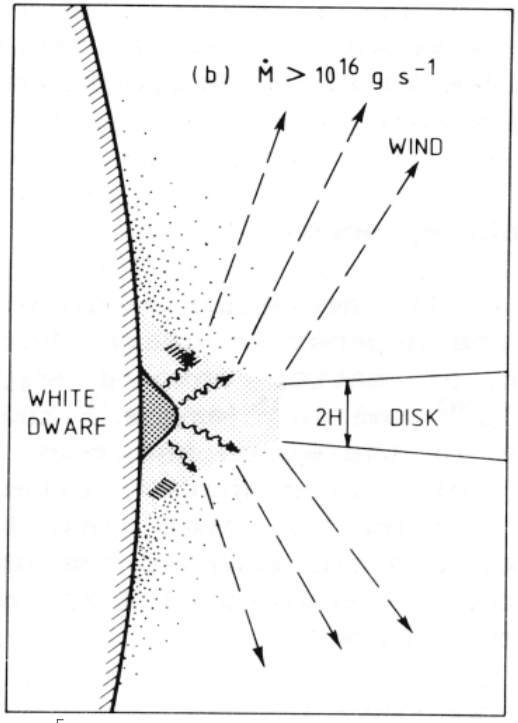


Collins & Wheatley 2009

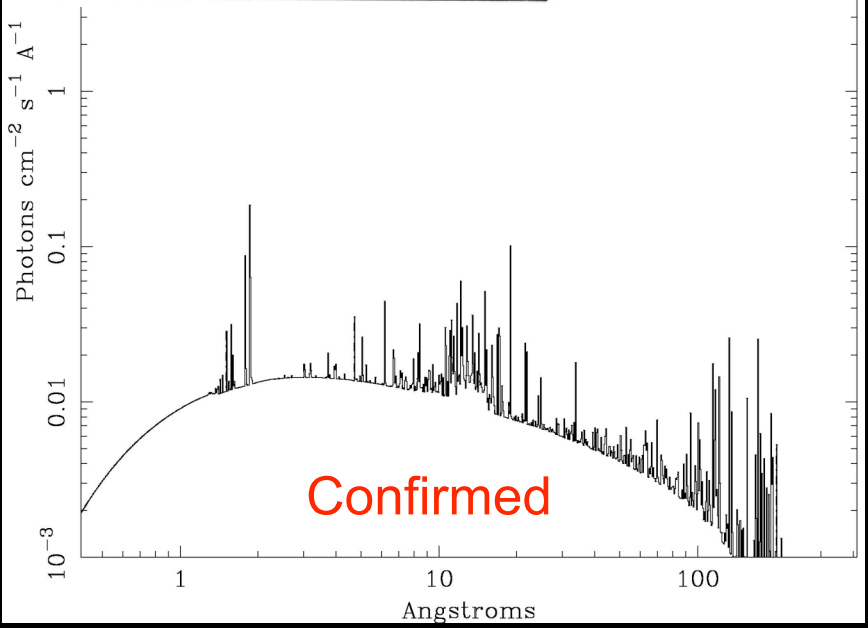
Hamuery et al



Patterson & Raymond 1985

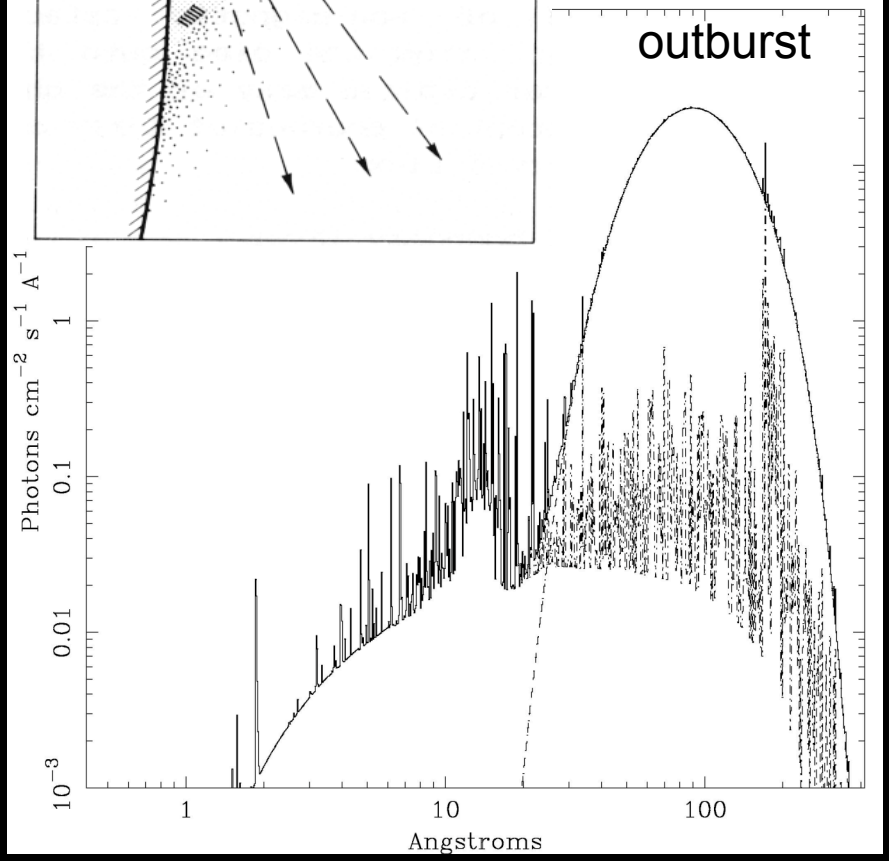


quiescence



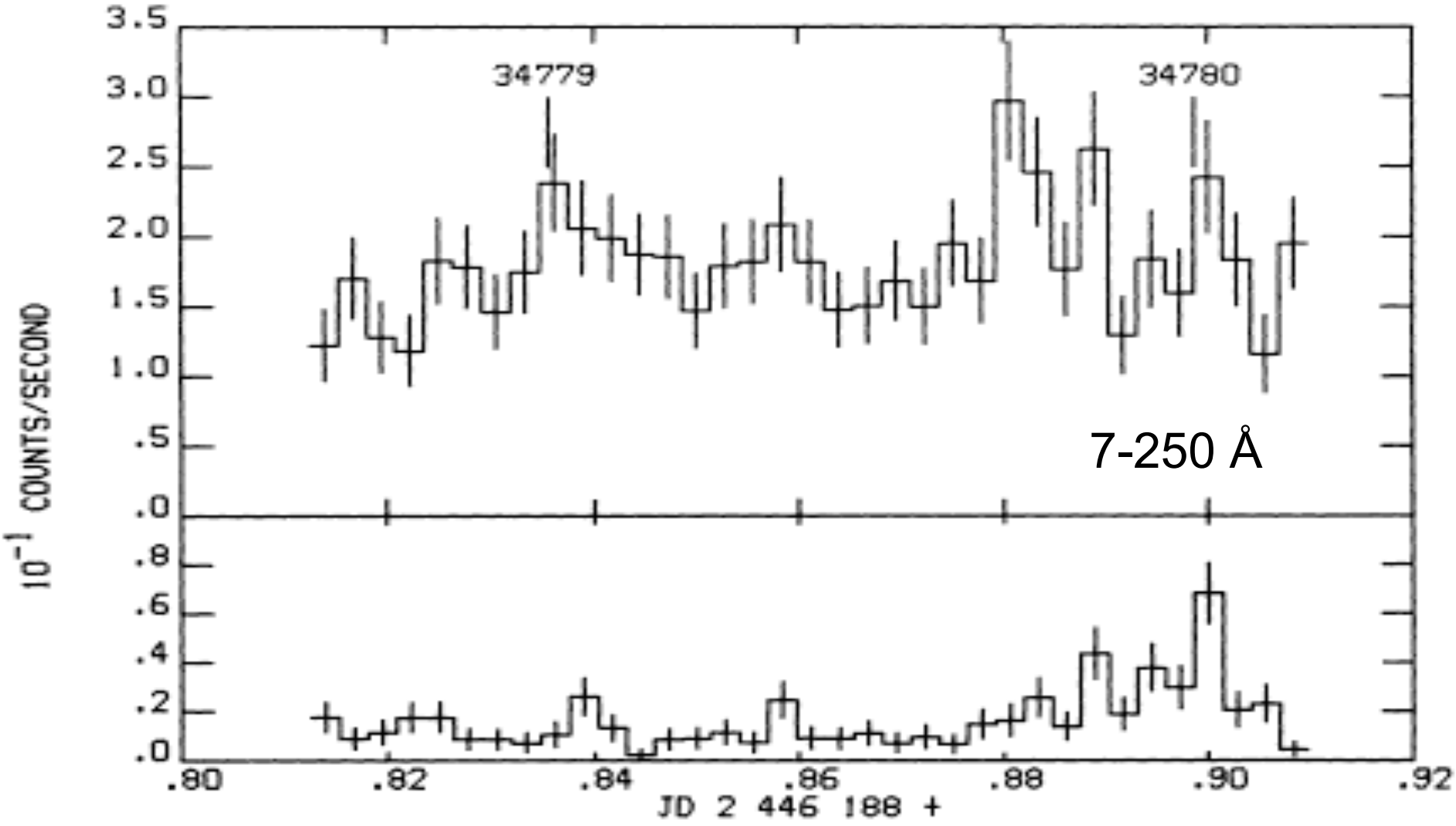
Confirmed

outburst



OY Car in outburst with EXOSAT LE

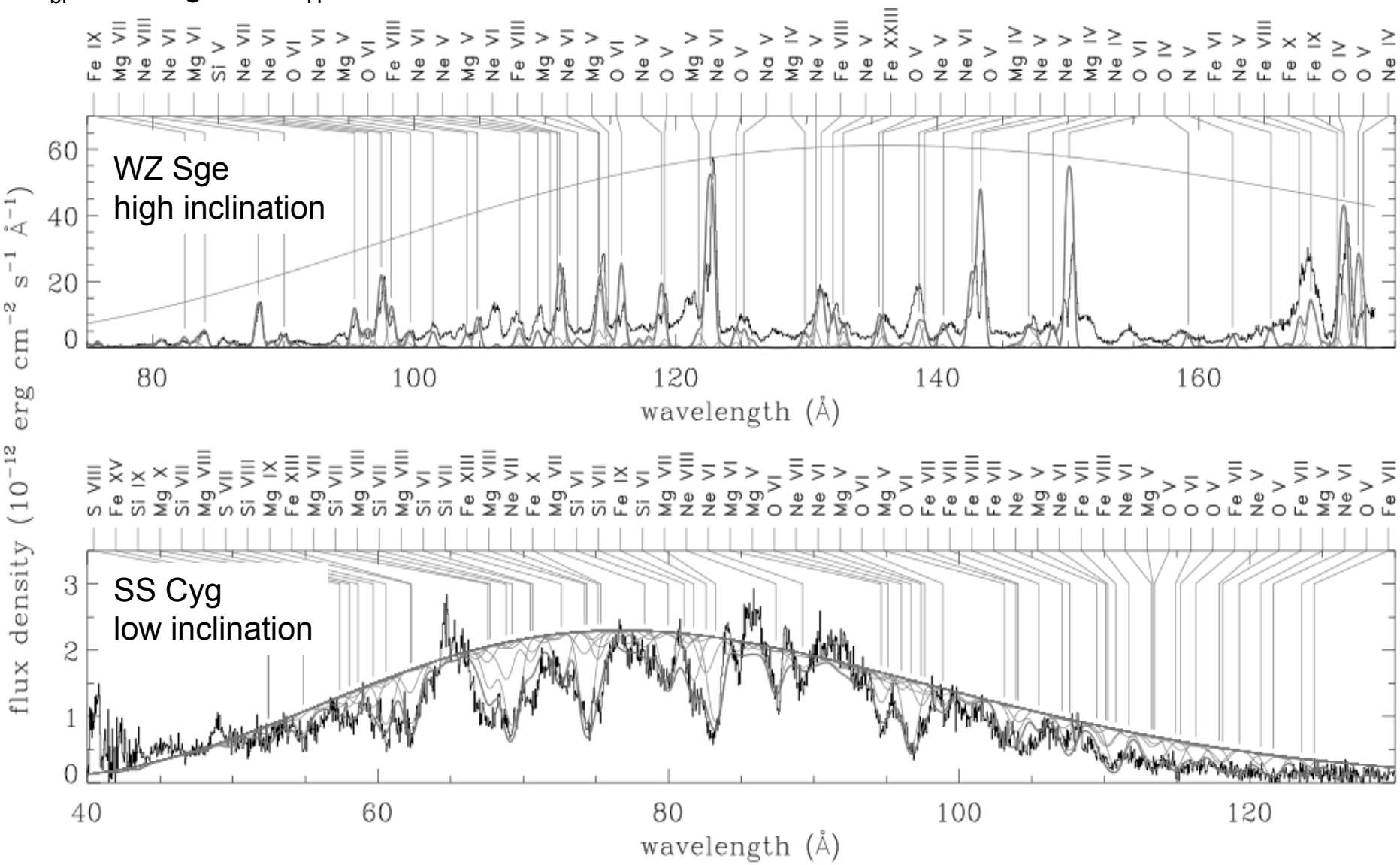
Naylor et al. 1988

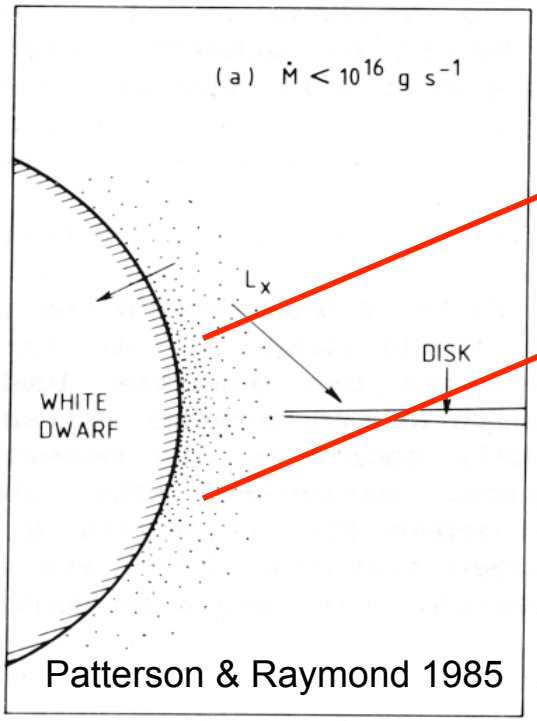


Chandra EUV spectra of dwarf novae in outburst

Mauche 2004

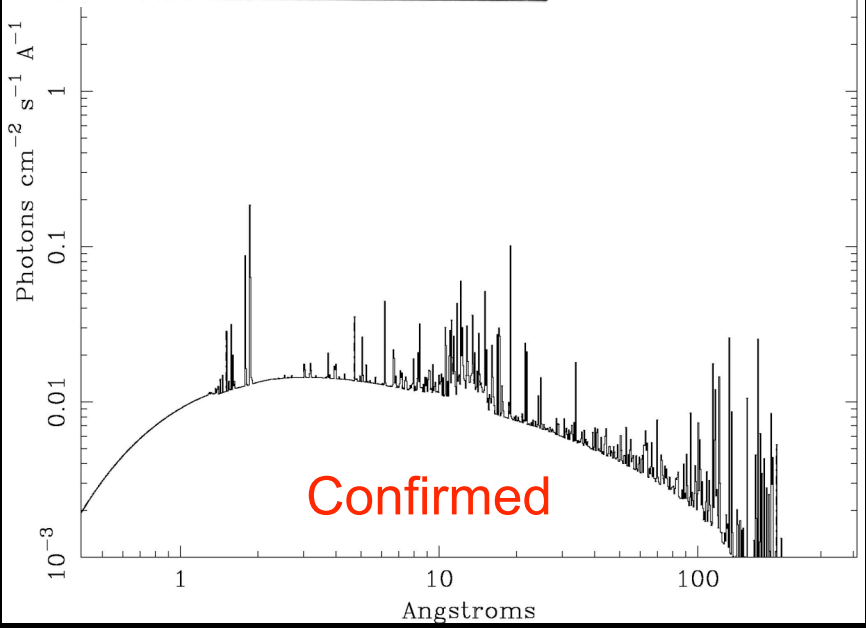
L_{bl}~10^{34} erg s-1 N_H~$3x10^{19}$ cm^{-2} V~2500 km s^{-1}



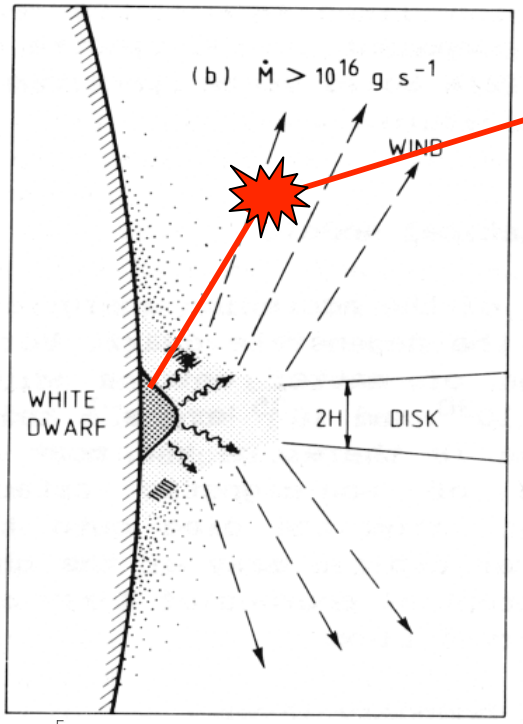


Patterson & Raymond 1985

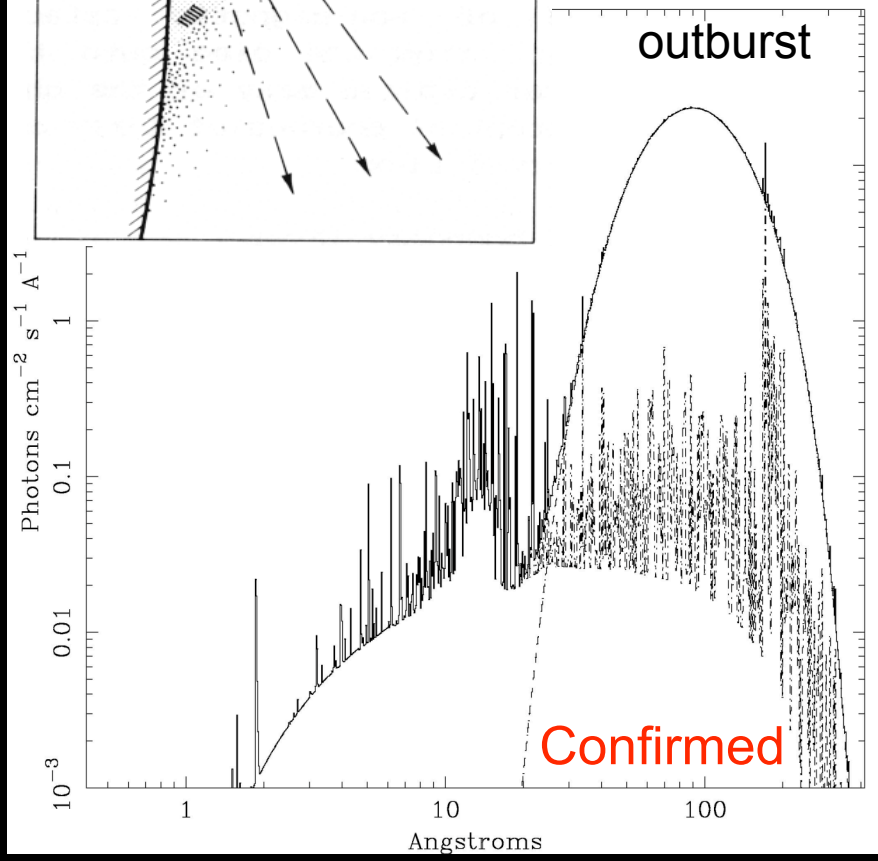
quiescence



Confirmed



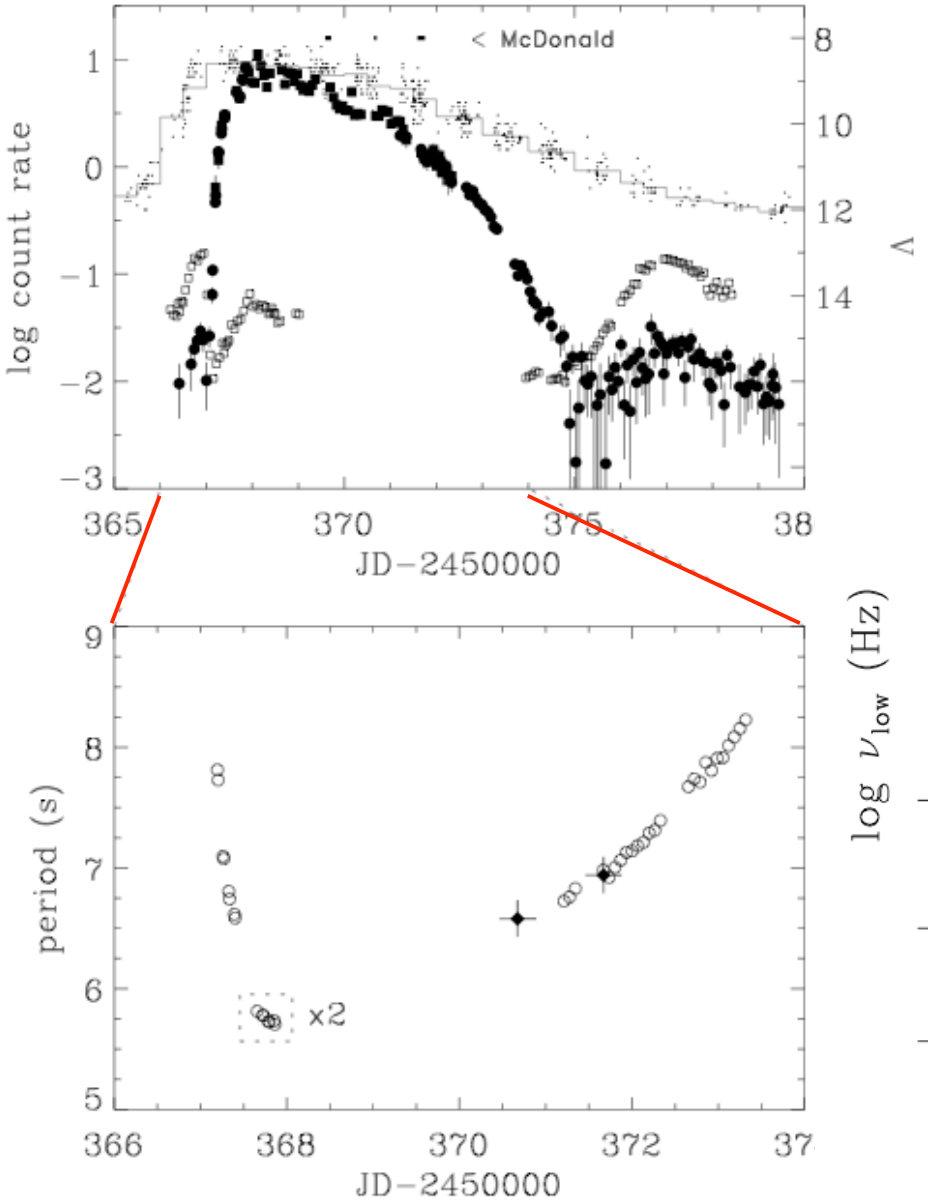
outburst

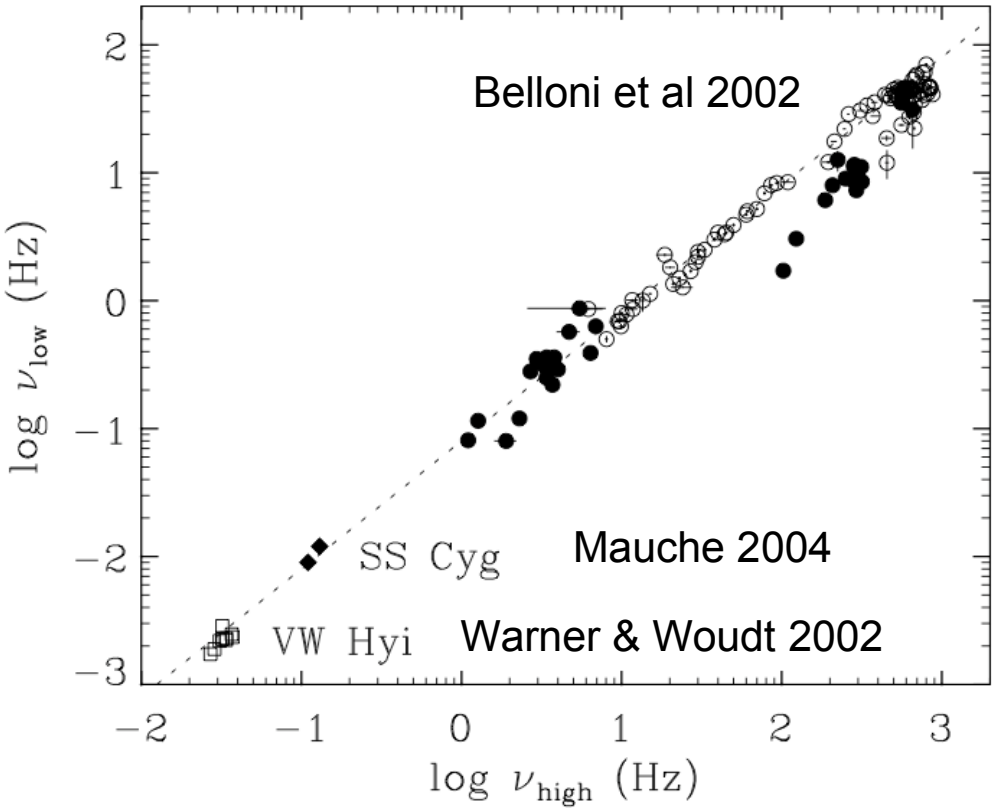


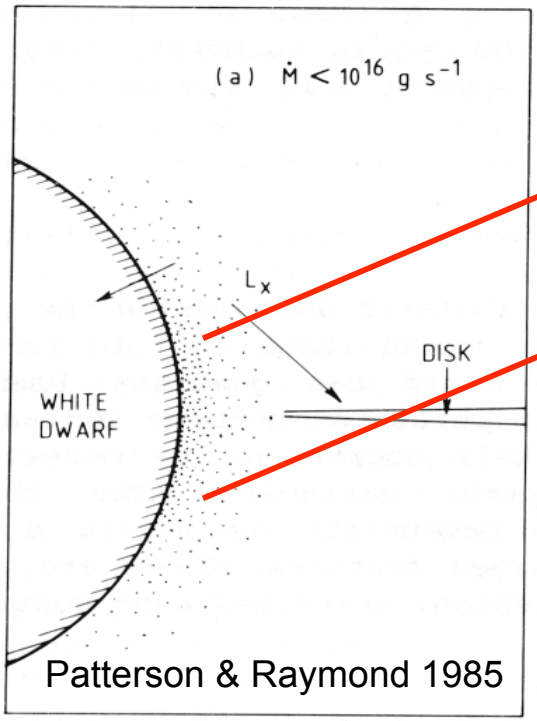
Confirmed

QPOs in dwarf nova outbursts

Mauche 2004

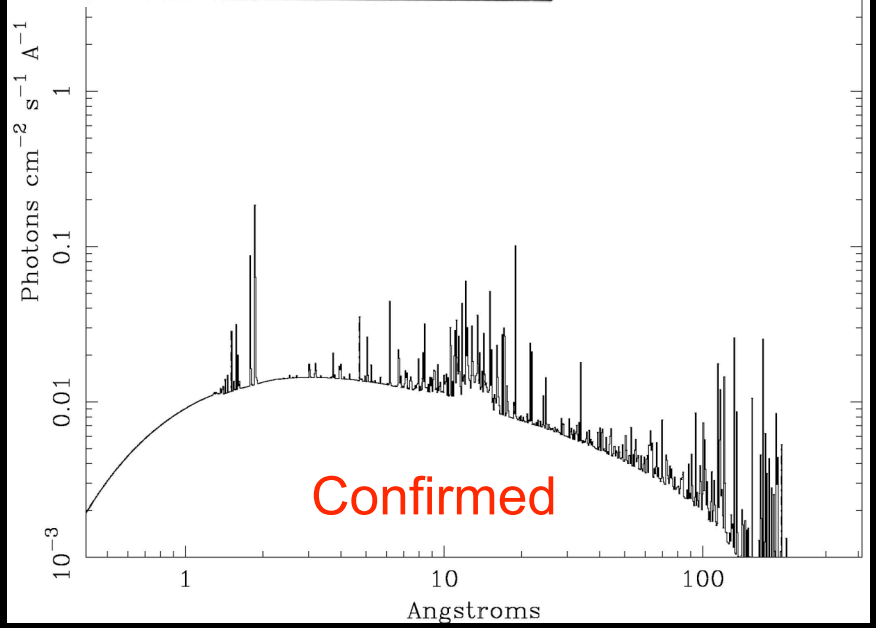


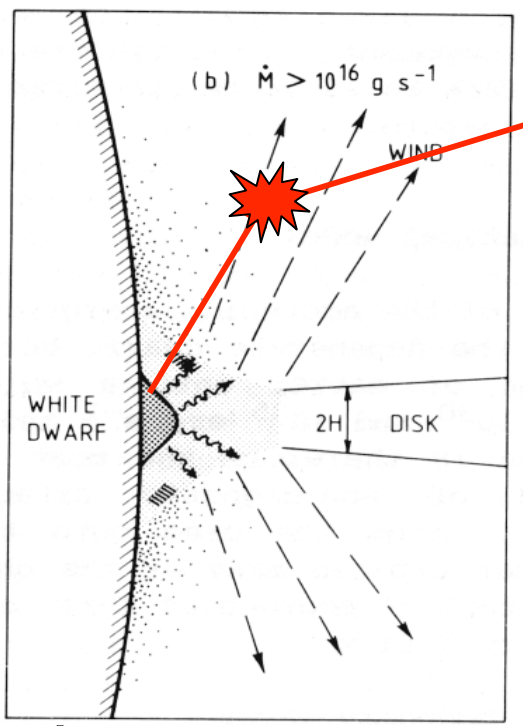




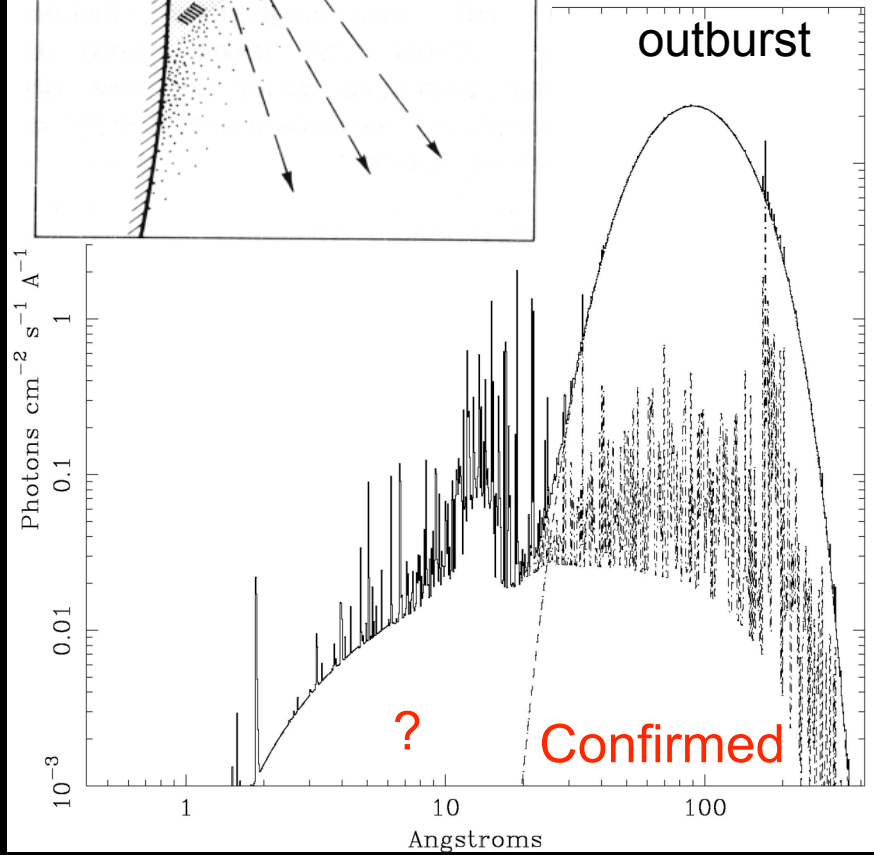
Patterson & Raymond 1985

quiescence

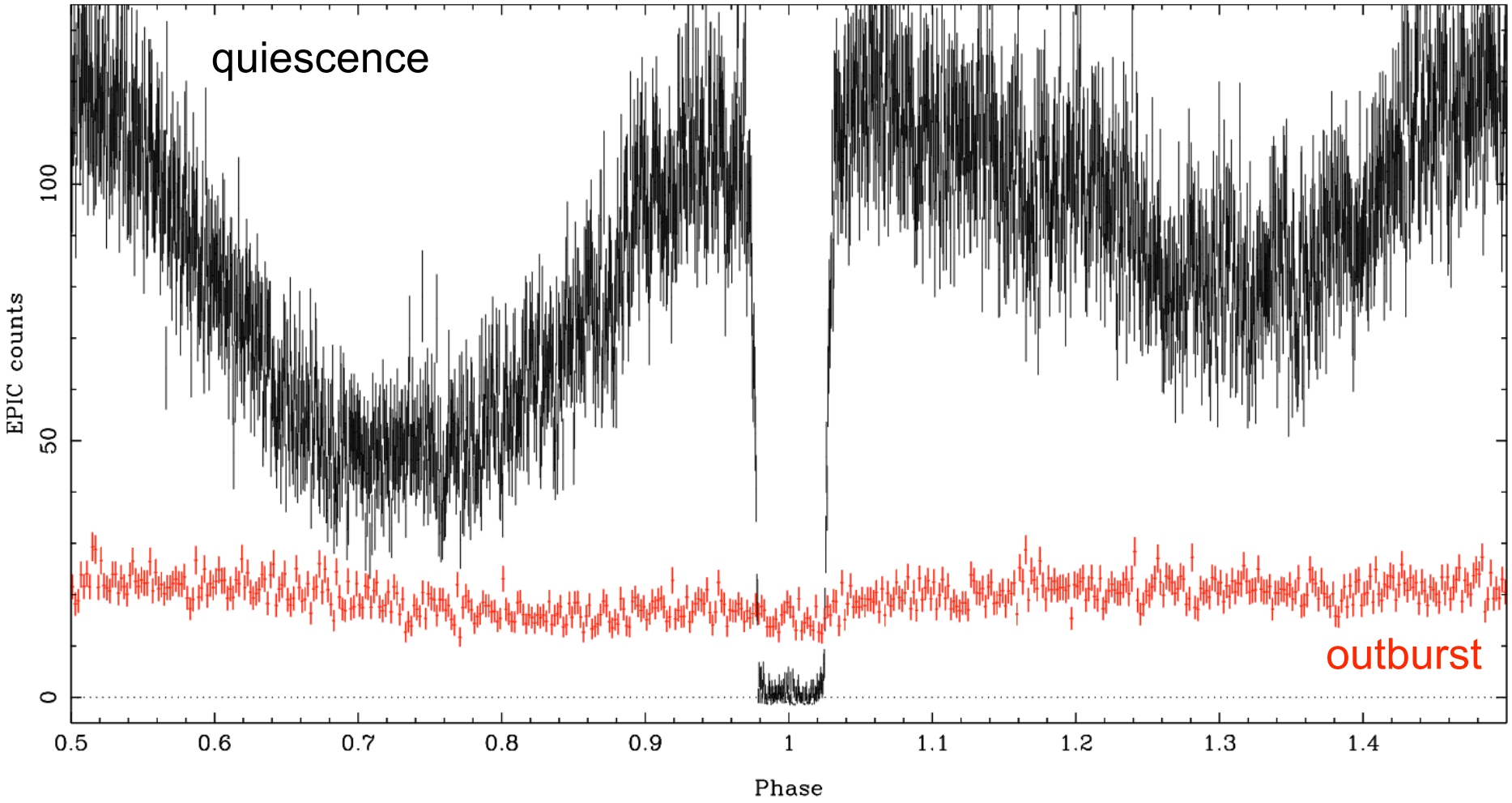




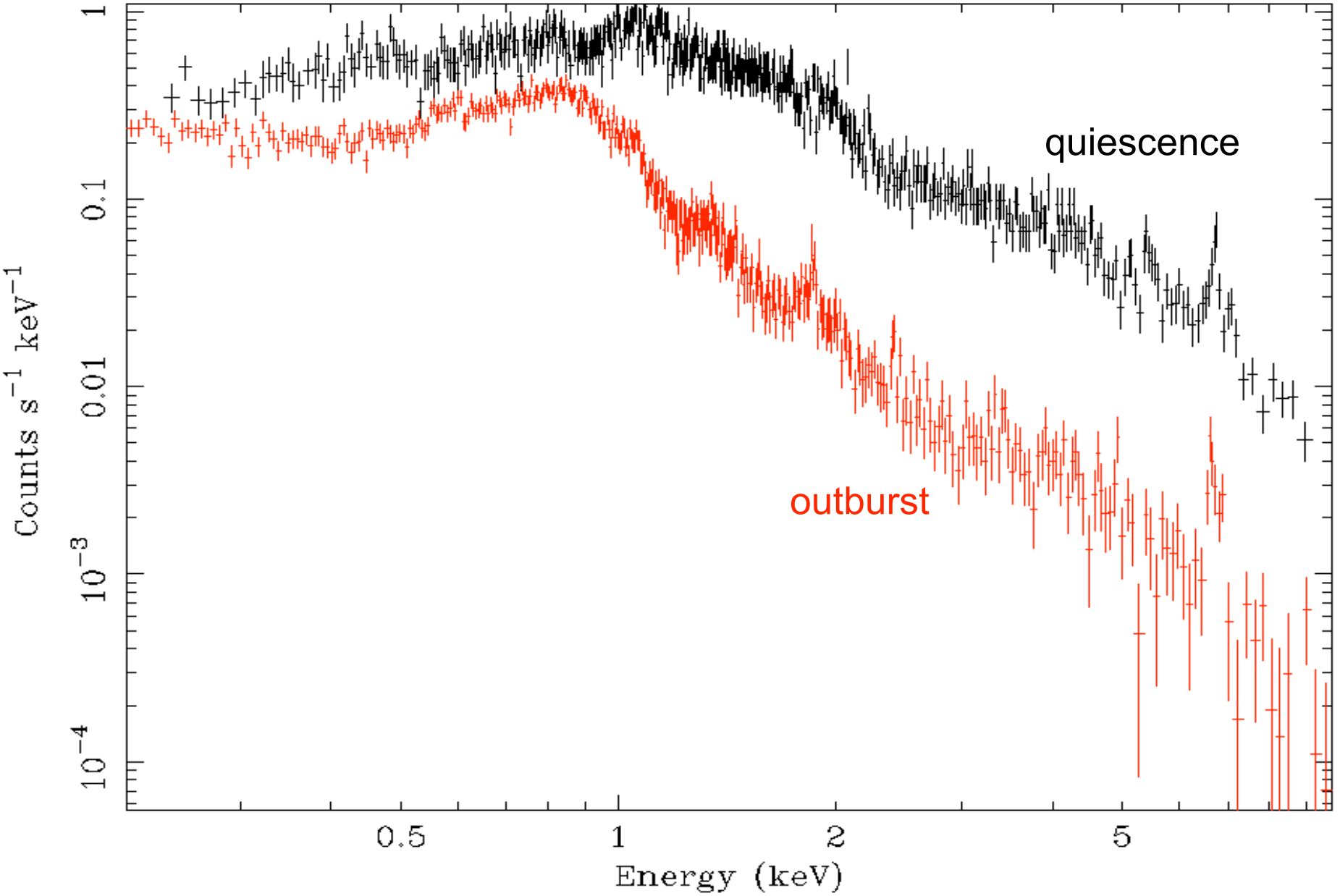
outburst



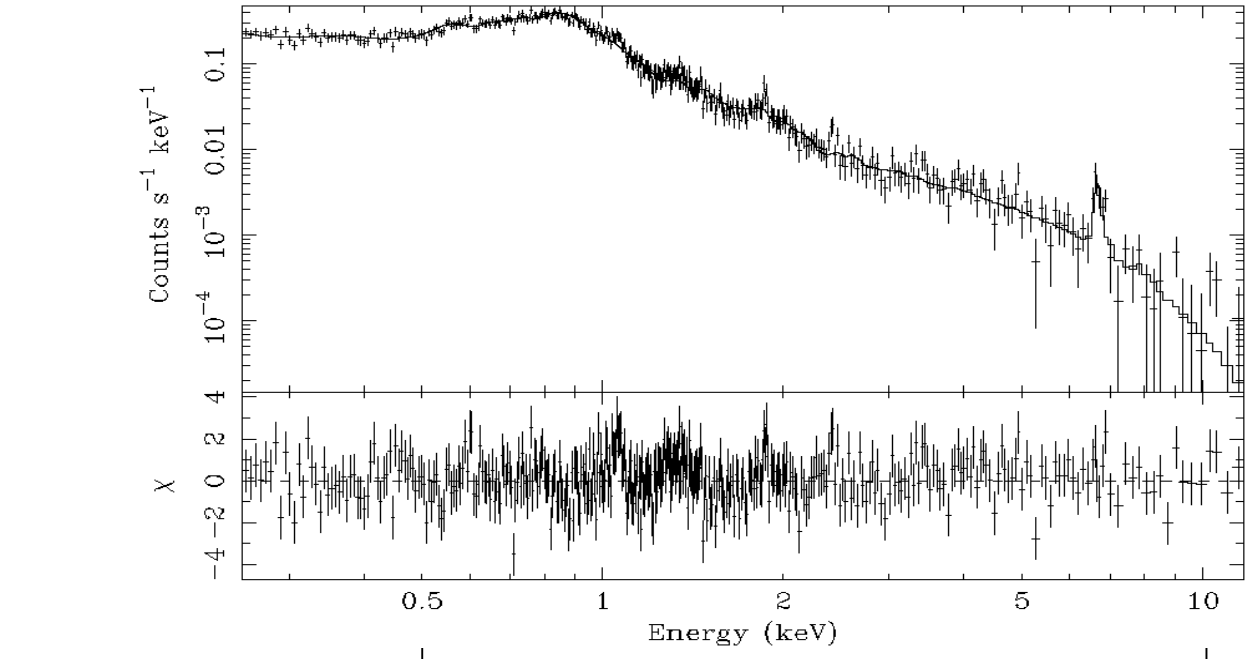
Z Cha in outburst with XMM-Newton

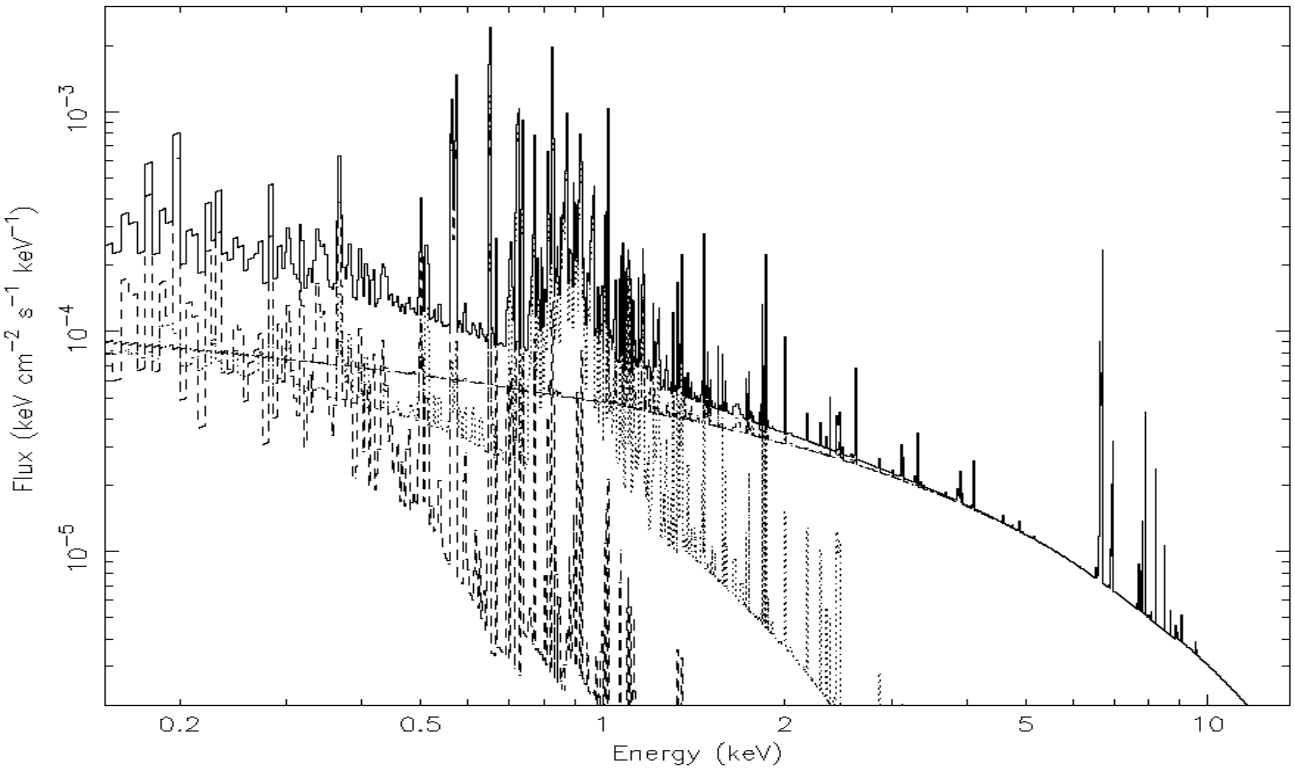


XMM-Newton spectra of Z Cha



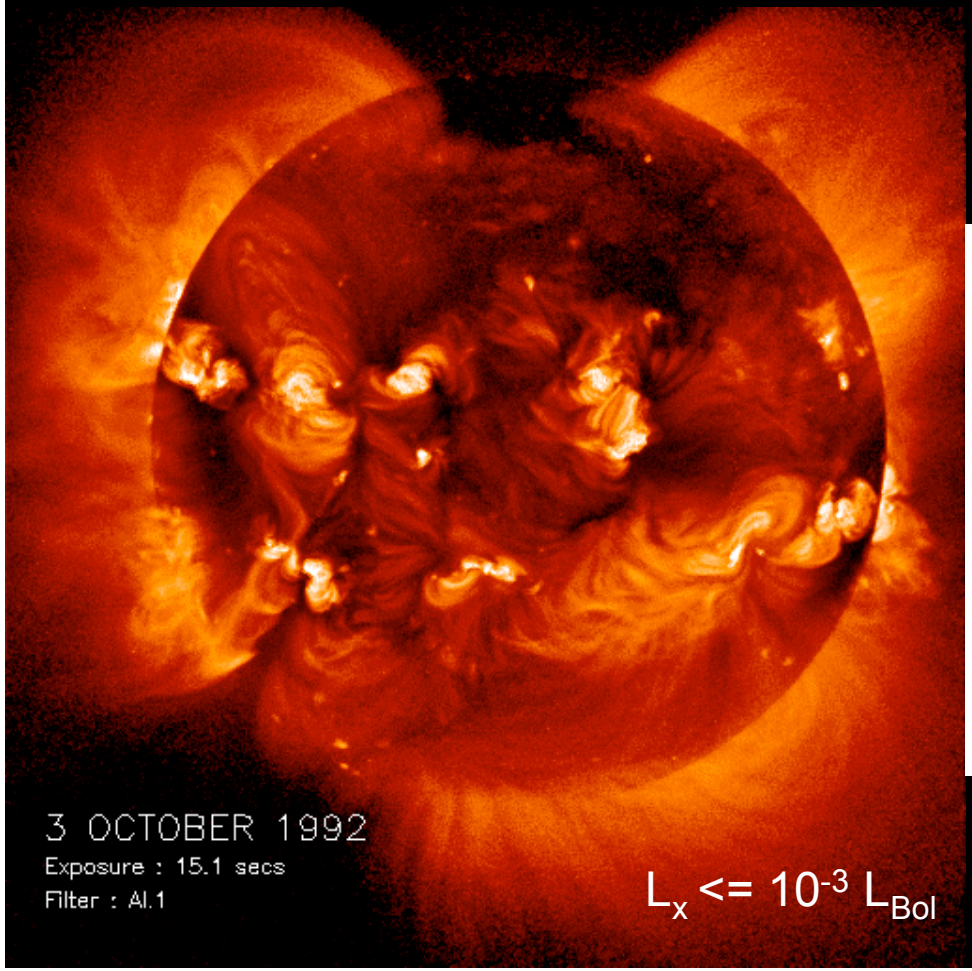
Outburst spectrum





Origin of outburst X-rays?

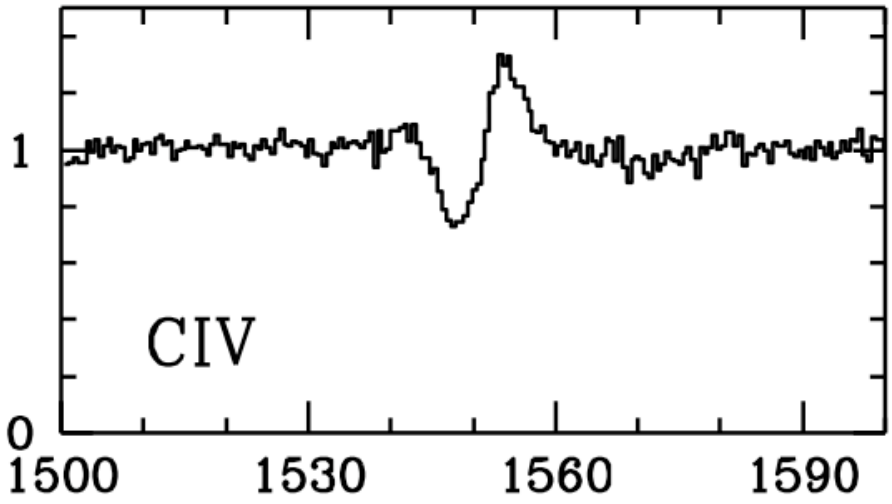
MRI-driven accretion disc corona?



$L_x <= 10^{-3} L_{Bol}$

Shocks in outflows/jets?

Z Cam with HUT Knigge et al 1997



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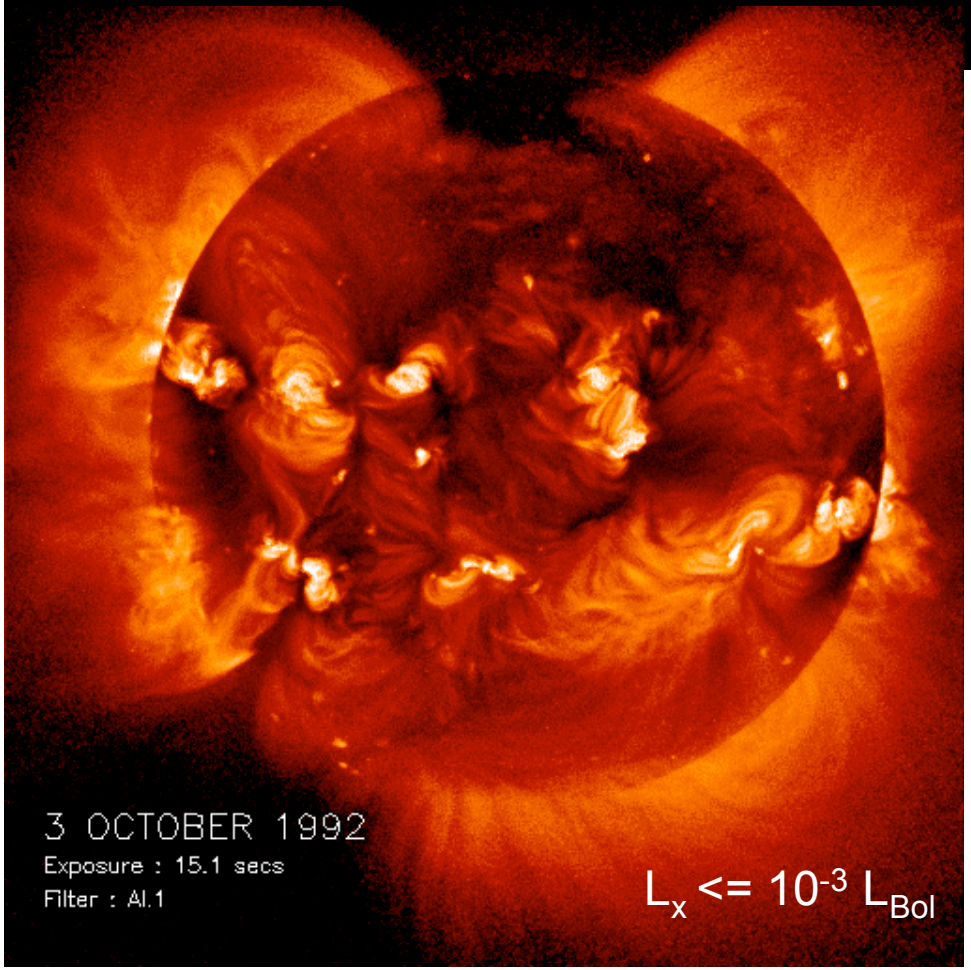
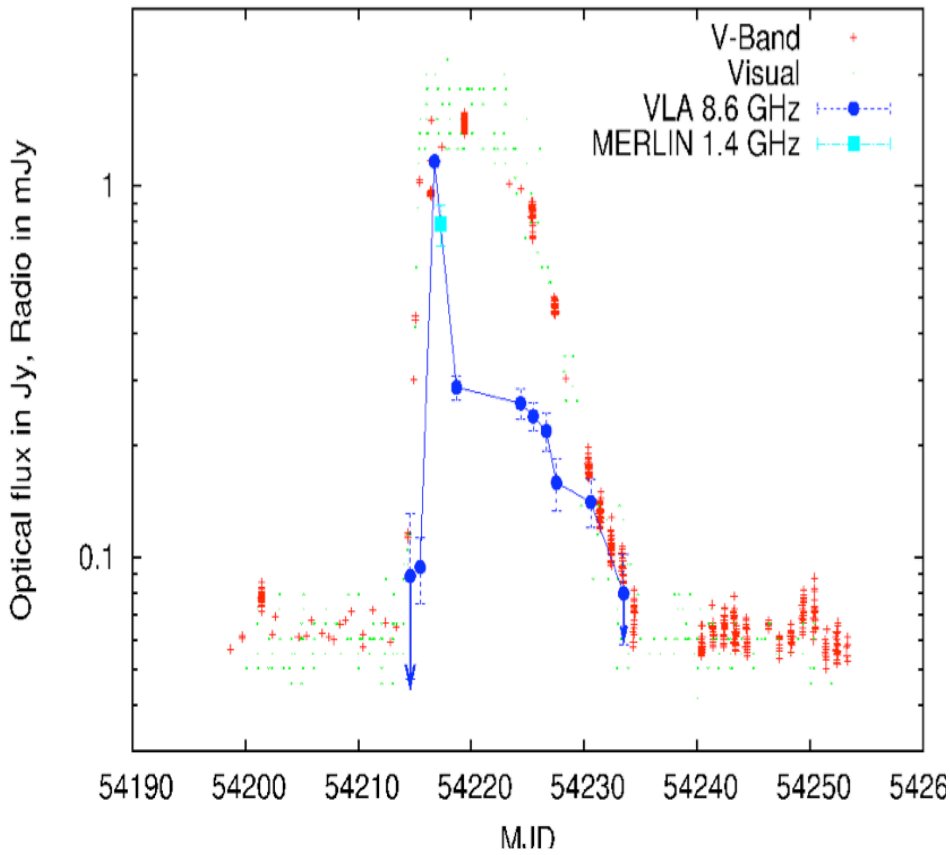
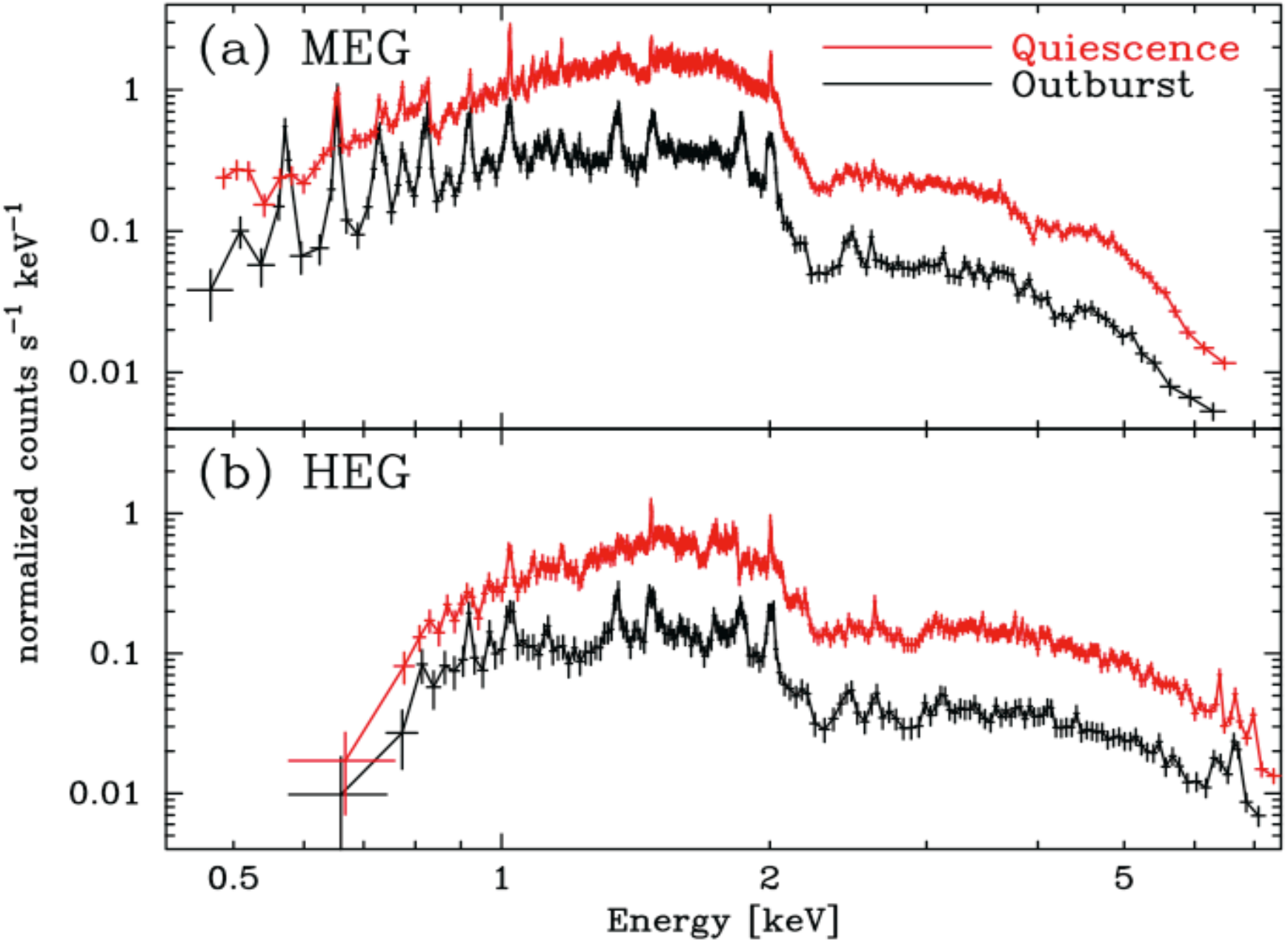


Koerding et al 2008



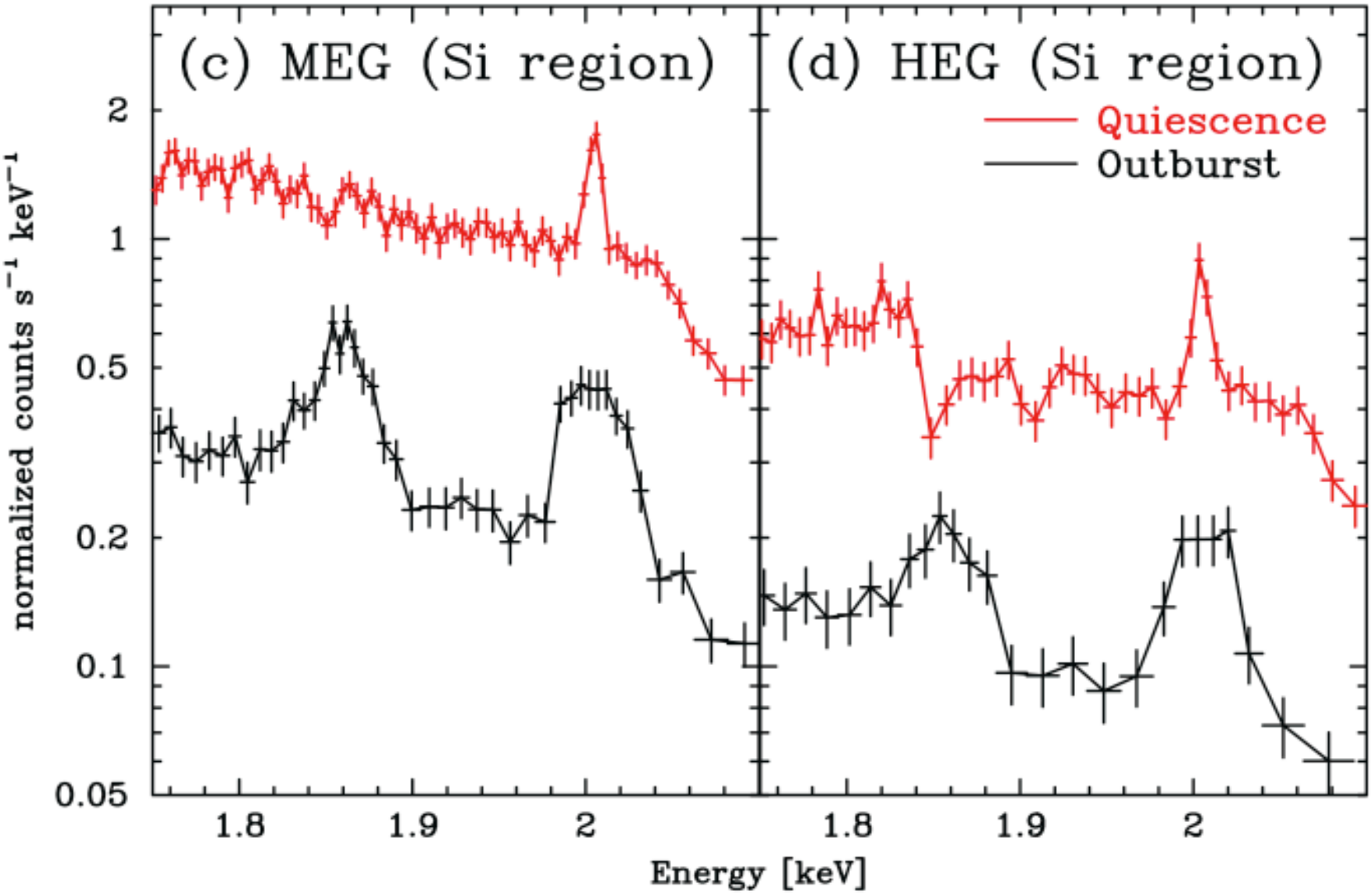
SS Cyg in outburst and quiescence

Okada et al 2008

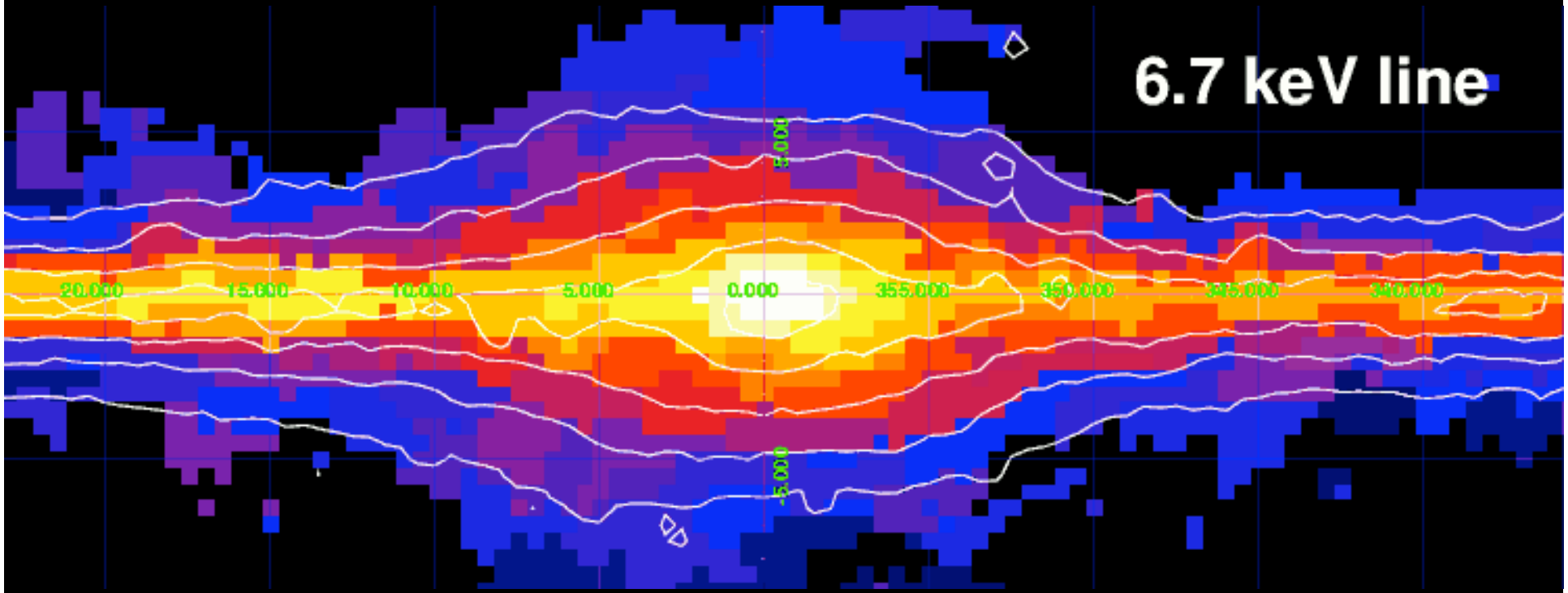


SS Cyg in outburst and quiescence

Okada et al 2008

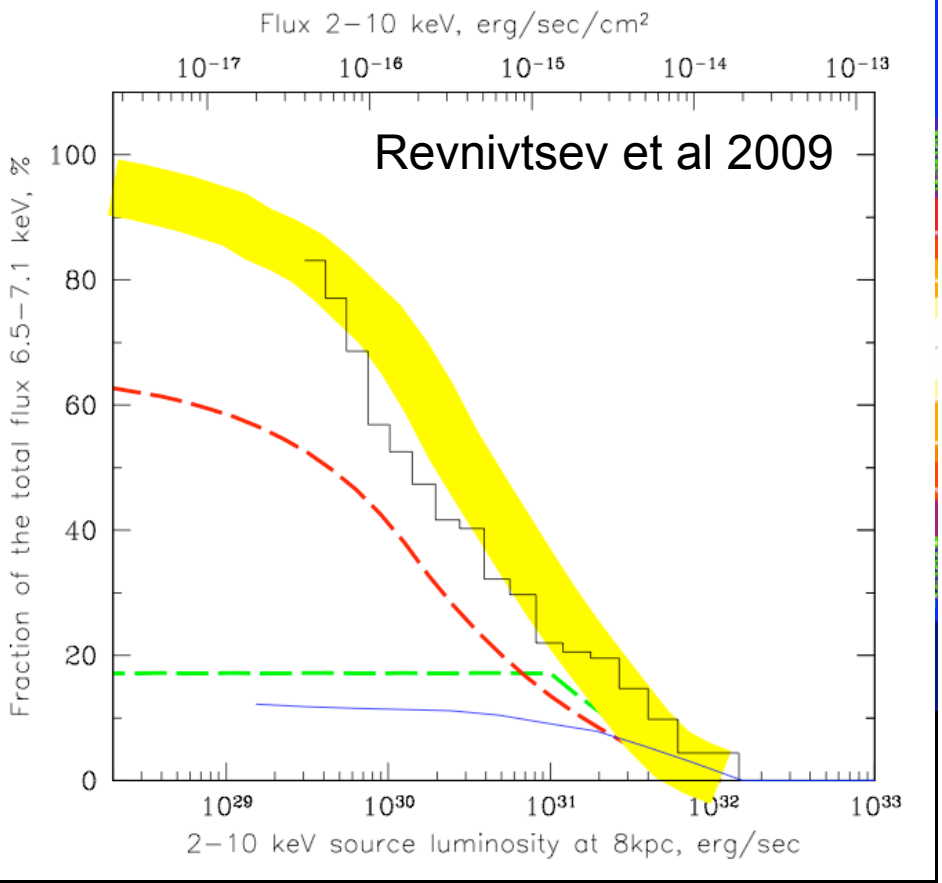


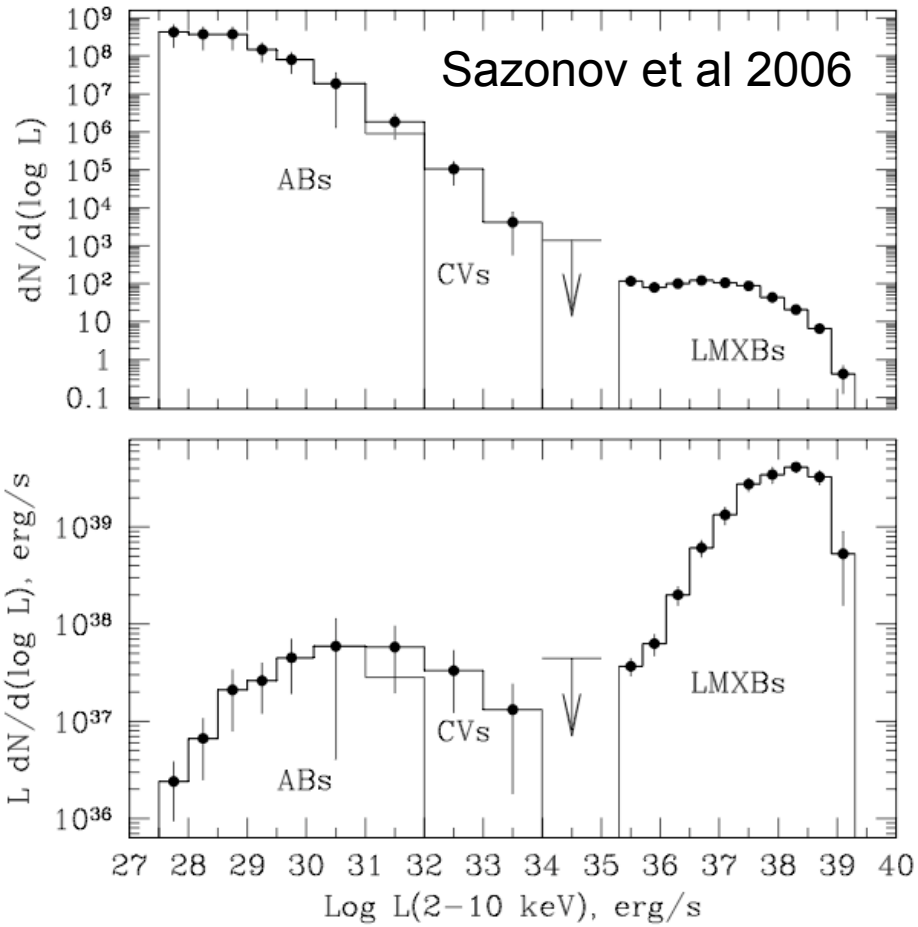
Galactic ridge X-ray emission



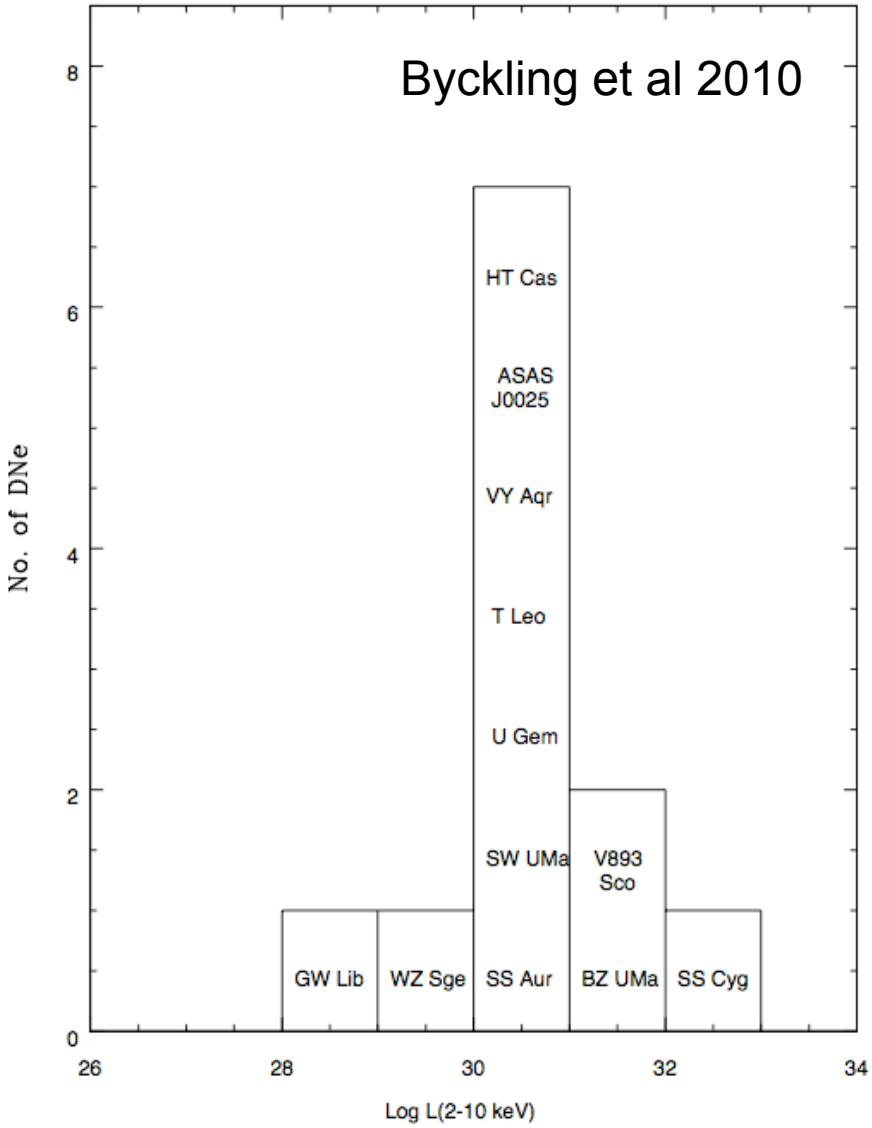
Revnivtsev et al 2006

Galactic ridge X-ray emission



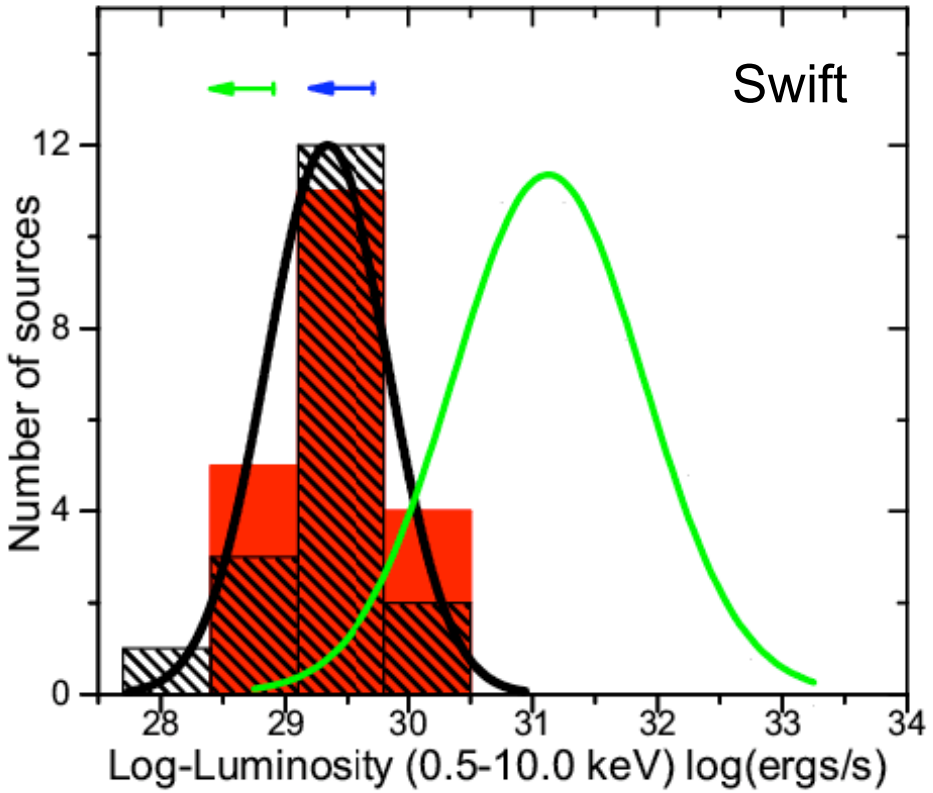


Galactic ridge X-ray emission



X-ray luminosities of SDSS-selected CVs

Reis, Wheatley et al 2010



Summary

- Disc instability model:
  - under predicts quiescent accretion rate by >100x
  - fails to explain outbursts in SS Cyg
- Origin of outburst X-ray emission unknown
  - MRI-driven corona?
  - Shocks in outflows/jets?
- Jets, outflows and QPOs all detected in CVs
  - models for BHs/NSs must also work for white dwarfs
- Galactic ridge X-ray emission:
  - contribution of non-magnetic CVs previously underestimated