The background of the slide features a repeating pattern of the Suzaku satellite's components, specifically the XIS (X-ray Imaging and Spectroscopy) detectors, arranged in a grid. Each component is depicted as a wireframe sphere with a grid of lines, representing the detector's structure.

Suzaku Observations of Cataclysmic Variables

Koji Mukai

for Manabu Ishida, Yukikatsu Terada,

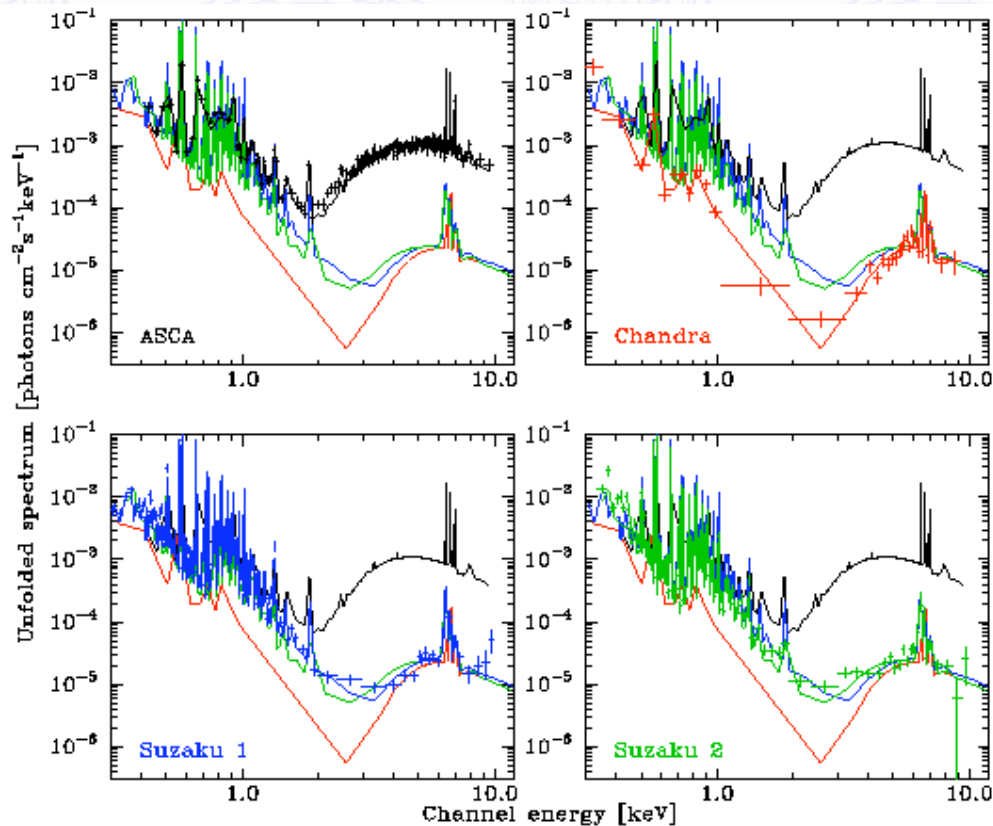
Kenji Hamaguchi

and the Suzaku Team

Symbiotic Star CH Cyg

CH Cyg is a symbiotic star (a white dwarf accreting from an M giant) with spectacular two-component spectra

Suzaku observations show a much weaker hard X-ray component than in ASCA data

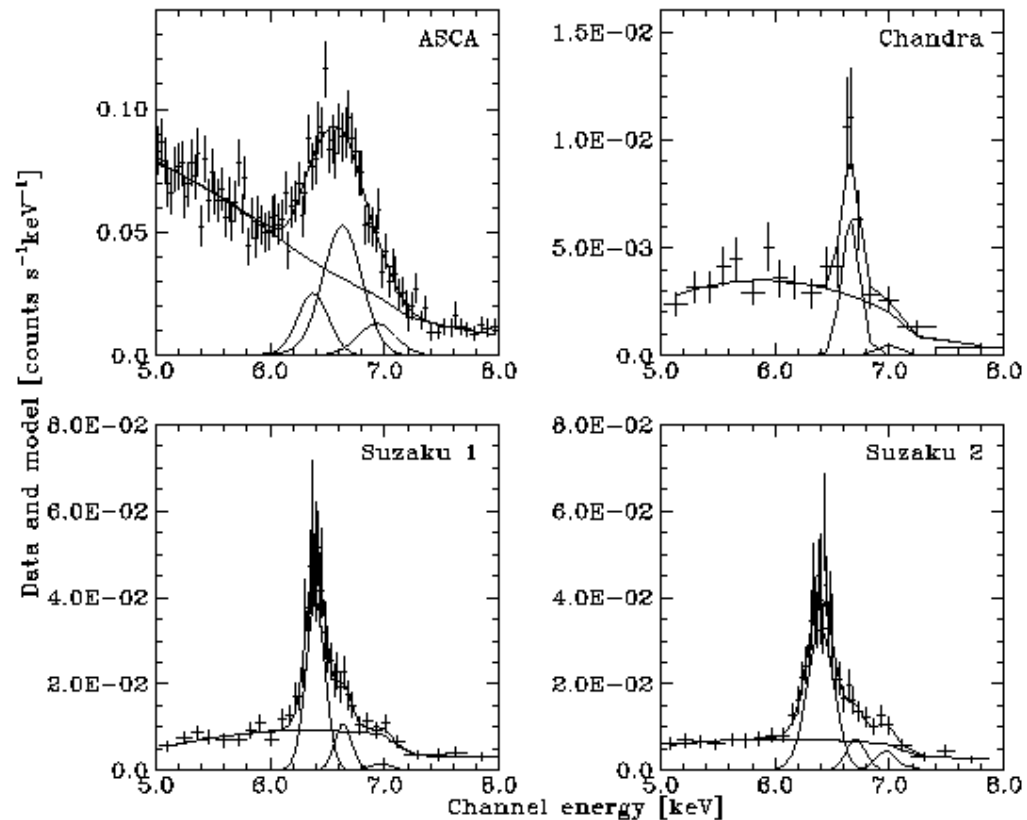


Scattering Dominated Spectrum

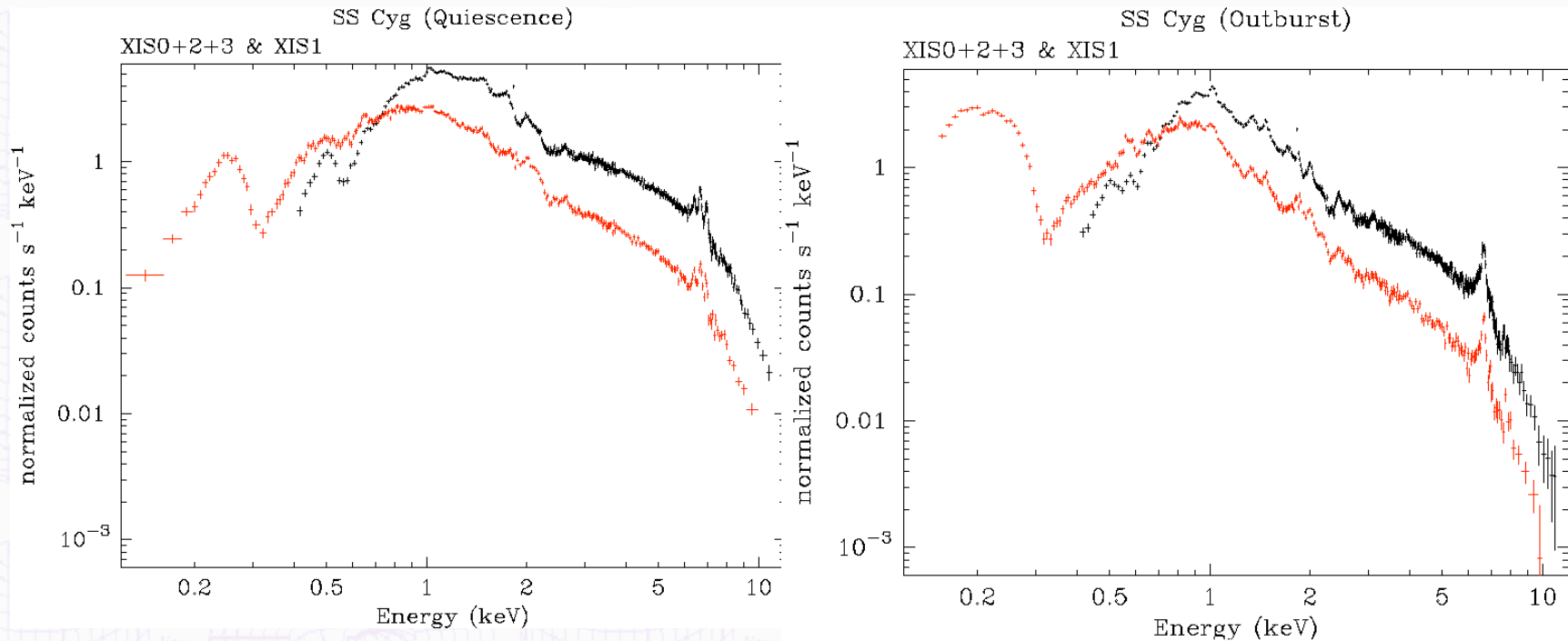
Fe K lines were dominated by the thermal components in ASCA and ACIS data

Now dominated by 6.4 keV fluorescent line: evidence that CH Cyg is now Seyfert-2 like

Mukai et al 2006, PASJ, in press



SS Cyg Observations



SS Cyg was observed twice with Suzaku in 2005 November.

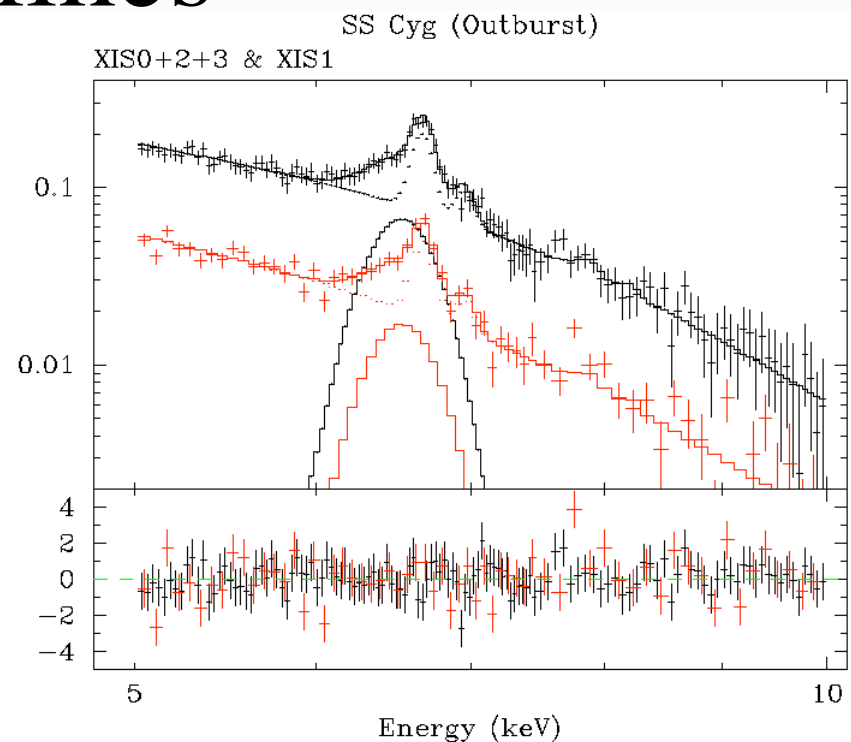
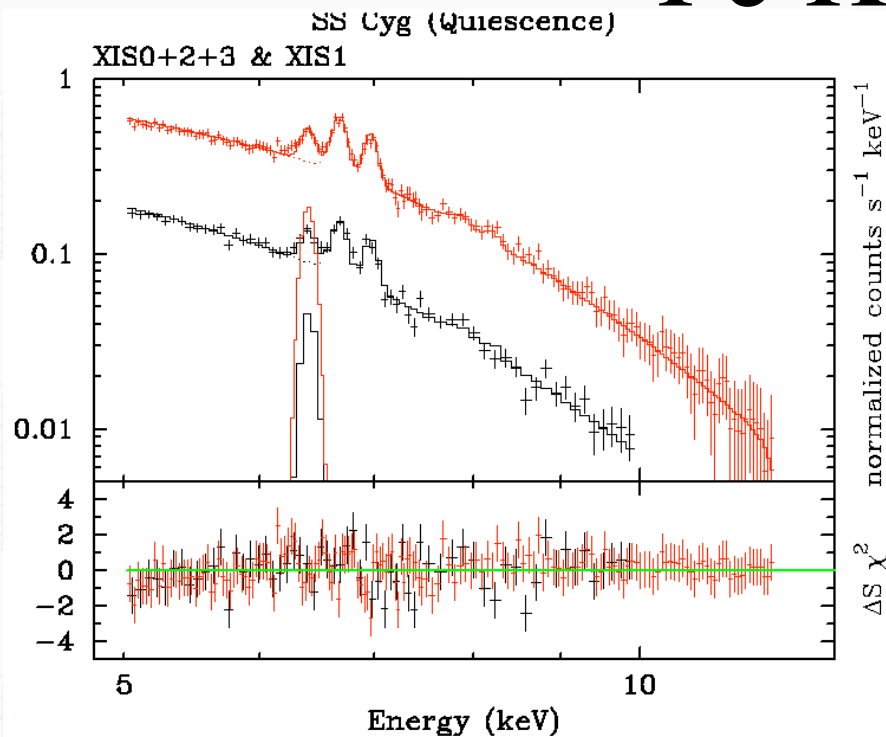
The hard component becomes weaker and softer in outburst, and there is an additional soft component. Multi-T fit suggest $Z \sim 0.3$

Ishida et al. in preparation

October 4, 2006

San Francisco HEAD

Fe K lines

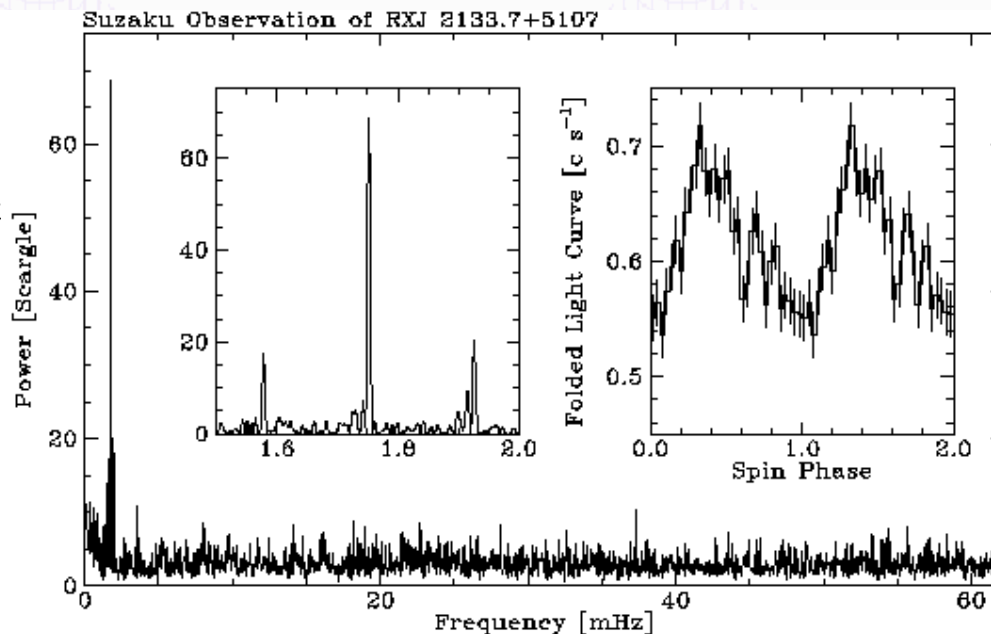


6.4 keV line: narrow (WD)+broad (Disk) in Q, broad-dominated in O. EqW of the narrow comp. in Q is ~ 50 eV, suggesting a compact boundary layer, consistent with eclipsing dwarf novae

Intermediate Polars

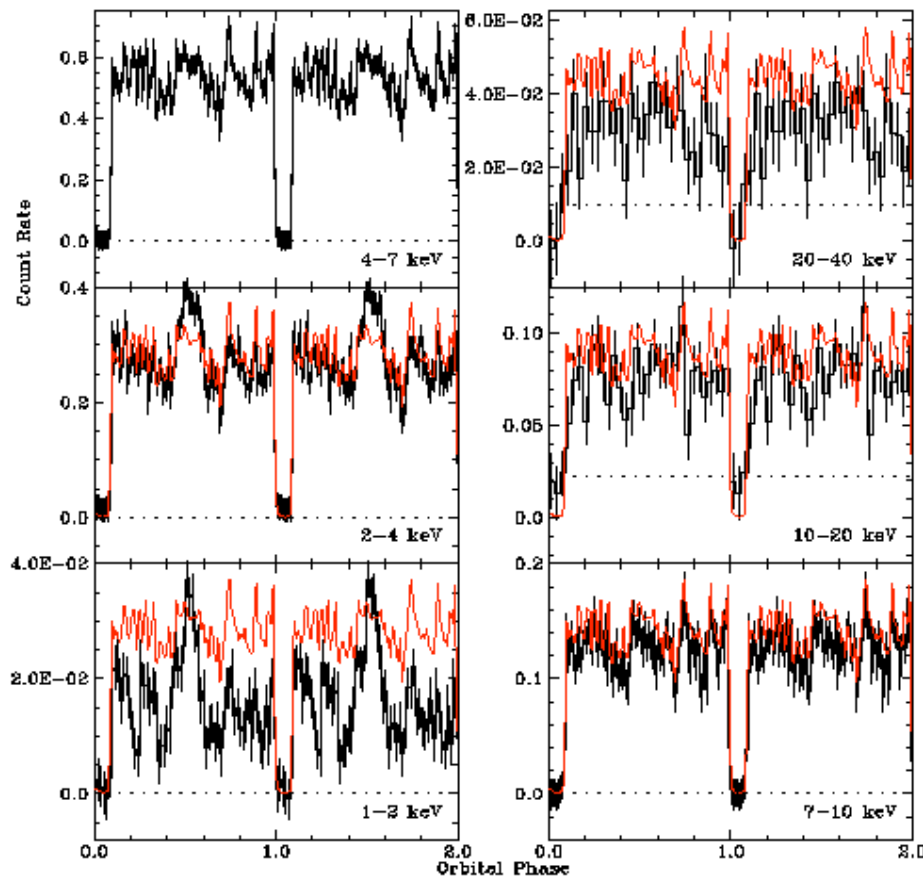
IPs are the hard X-ray brightest CVs, whose defining characteristic is the spin modulation in the X-rays

Example: AO-1 (GO) observation of RXJ 2133.7+5107



An eclipsing IP, XY Ari, was observed during the SWG phase because of its location behind MBM12 (see 1.17)

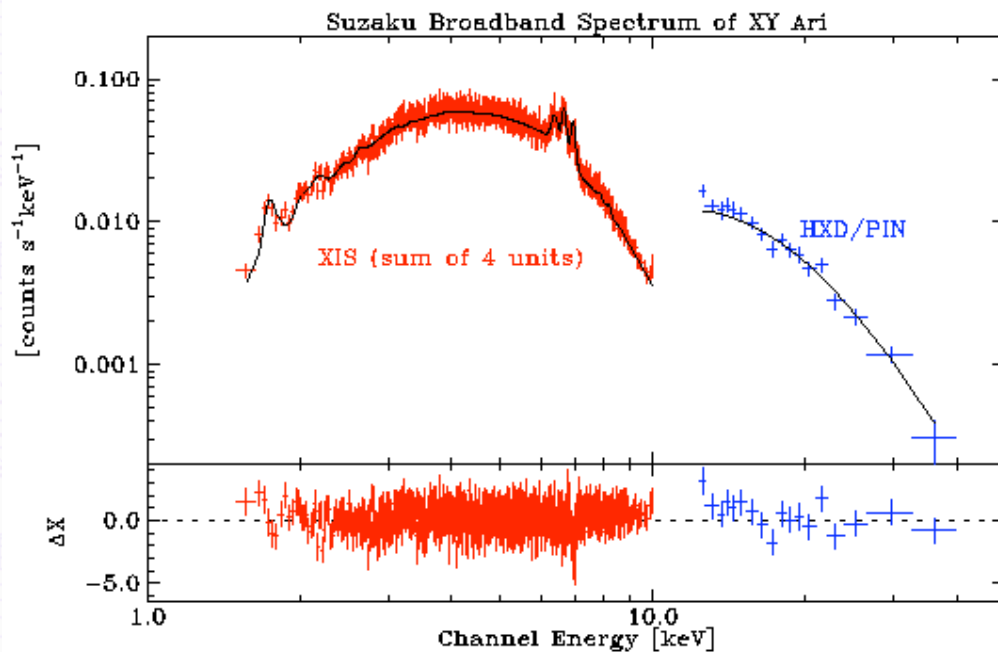
Orbital Modulation of XY Ari



Folding the XIS and PIN light curves of XY Ari on the orbital period, the eclipse is clearly visible up to 40 keV.

This validates the background subtraction

Broad-Band Spectrum of XY Ari



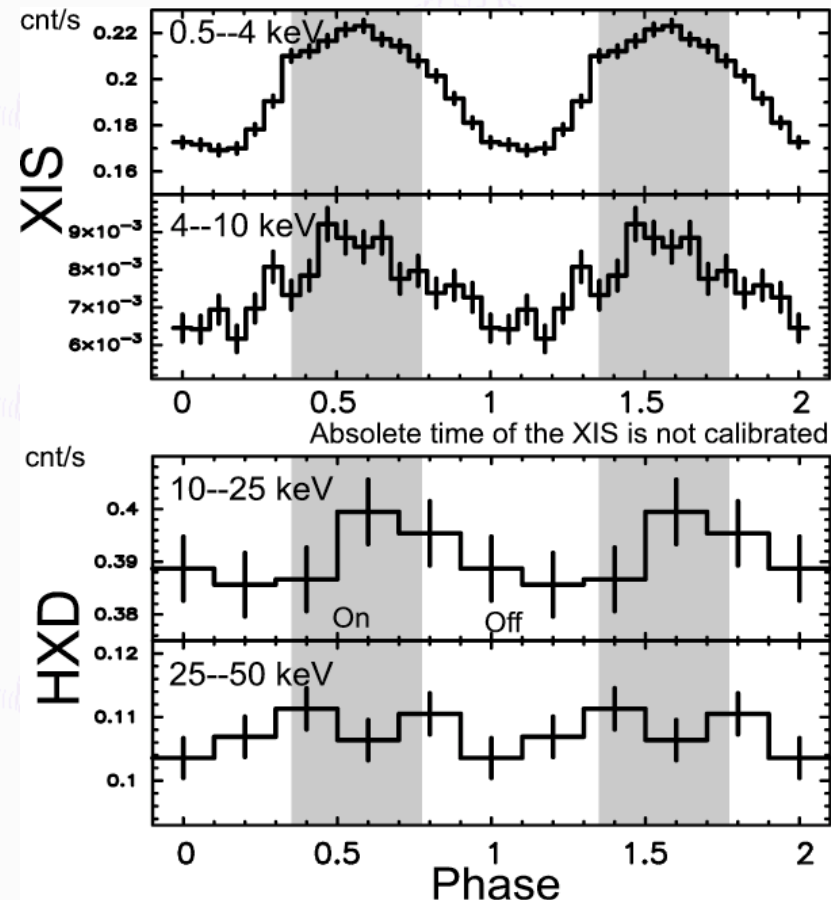
Model incorporates:
complex absorber, multi-temperature
plasma, reflection, and 6.4 keV line

XY Ari is a relatively faint IP - previous spectral studies (with Ginga and RXTE) were limited to $E < 20$ keV. Suzaku has the potential to make an important test of broad-band spectral models of IPs such as XY Ari

Hard X-rays from AE Aqr

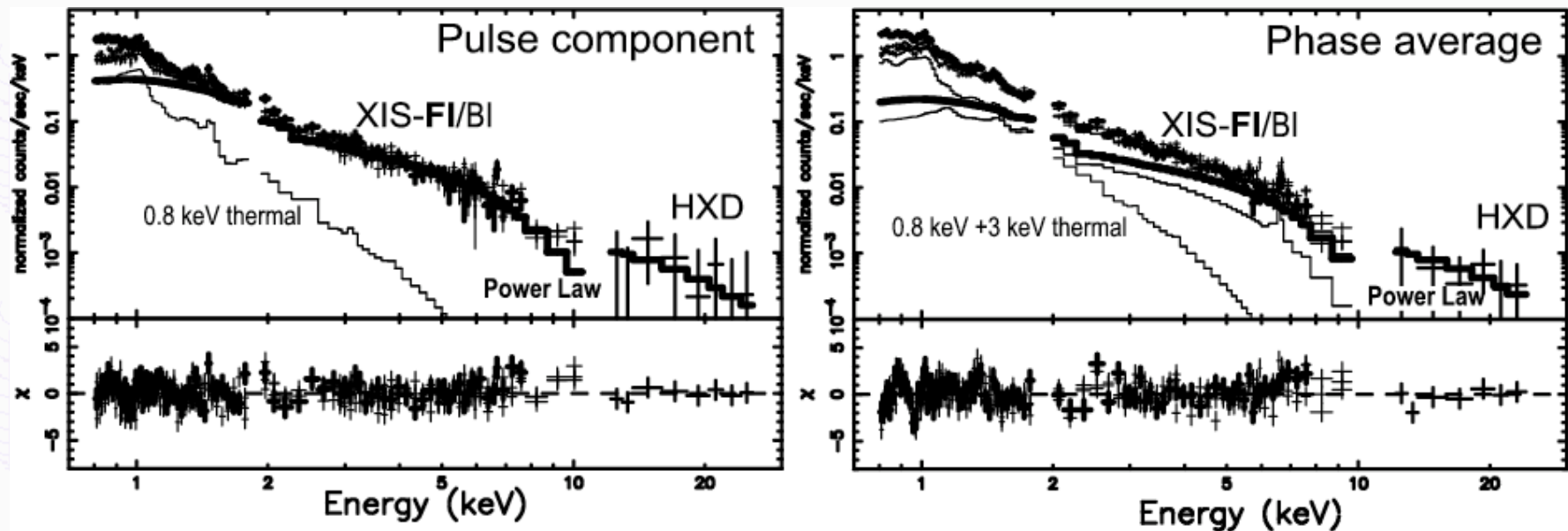
AE Aqr is an unusual IP with fast (33 s) spin period and soft X-ray spectrum. It is a propellar system, and is detected in radio and gamma-rays.

Spin modulation allows detection of faint hard X-rays in AE Aqr: modulation is clearly detected in XIS, and also in HXD/PIN in the 10-25 keV range.



Terada et al. in preparation

Non-Thermal Emission



Pulse (max-min): power-law (2.3) over 3-25 keV, 3.5×10^{-12} (10-100 keV), plus soft ($kT=0.8$ keV) thermal emission

Pulse ave: PL, 0.8 keV thermal, 3 keV thermal (no spin modulation) - PL represents $<0.01\%$ of spin-down energy of WD

Summary

- Suzaku's capabilities match the needs of CV research well (and those of a few exceptional stars)
- In particular, the simultaneous measurements of soft and hard thermal components, and of Fe K lines and hard continuum, have the potential to revolutionize the field
- **AO-2 proposals are due Dec 1, 2006** - ask us for details!