(Estimation of the magnetic field) and accretion flow geometry of Low Mass X-ray Binaries

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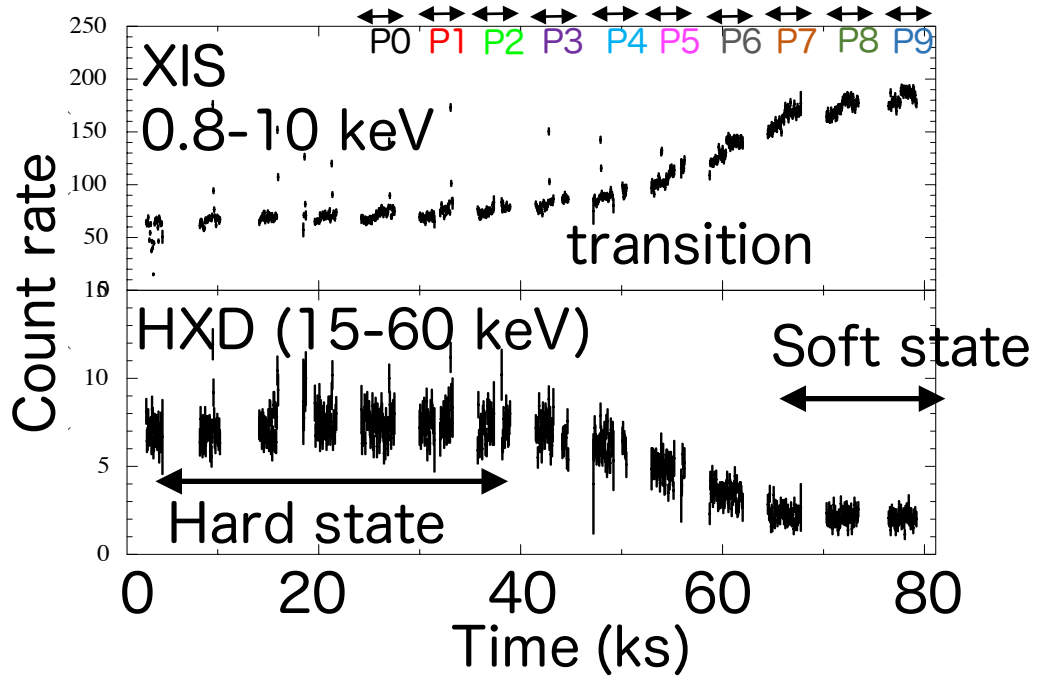
Aquila X-1 during a hard-to-soft state transition

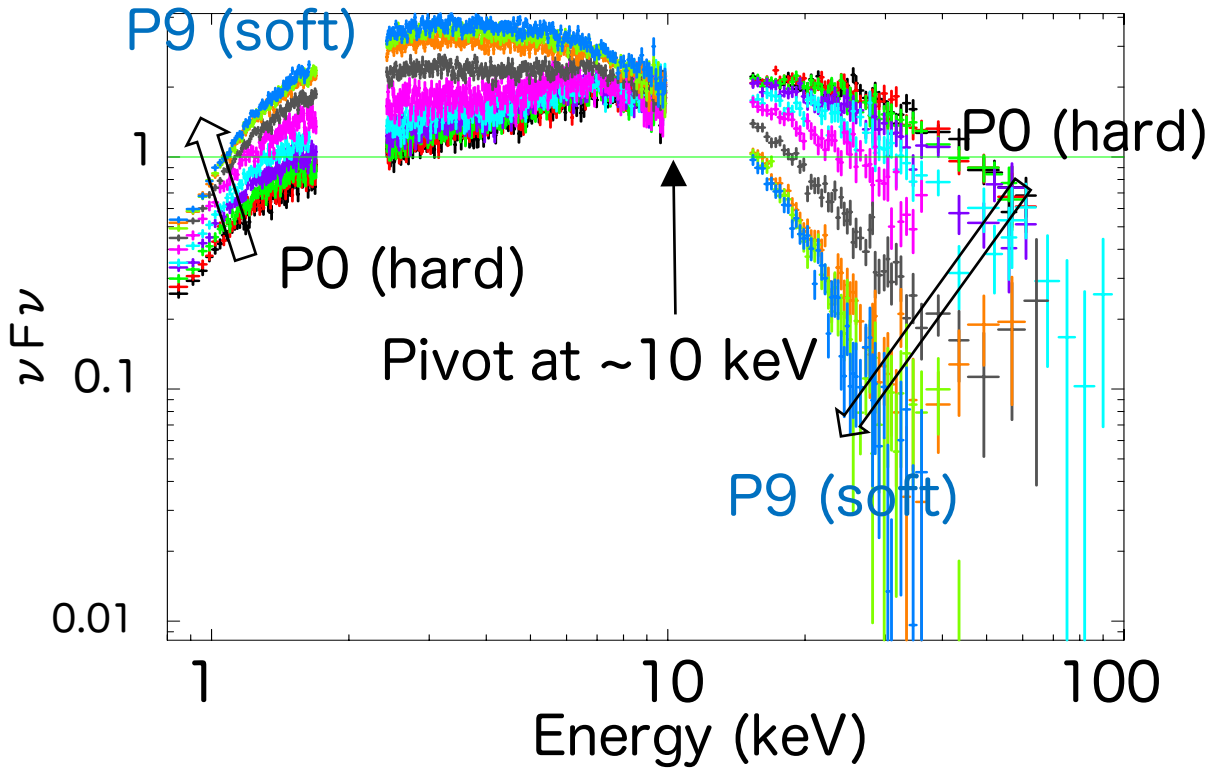
NS LMXBs:

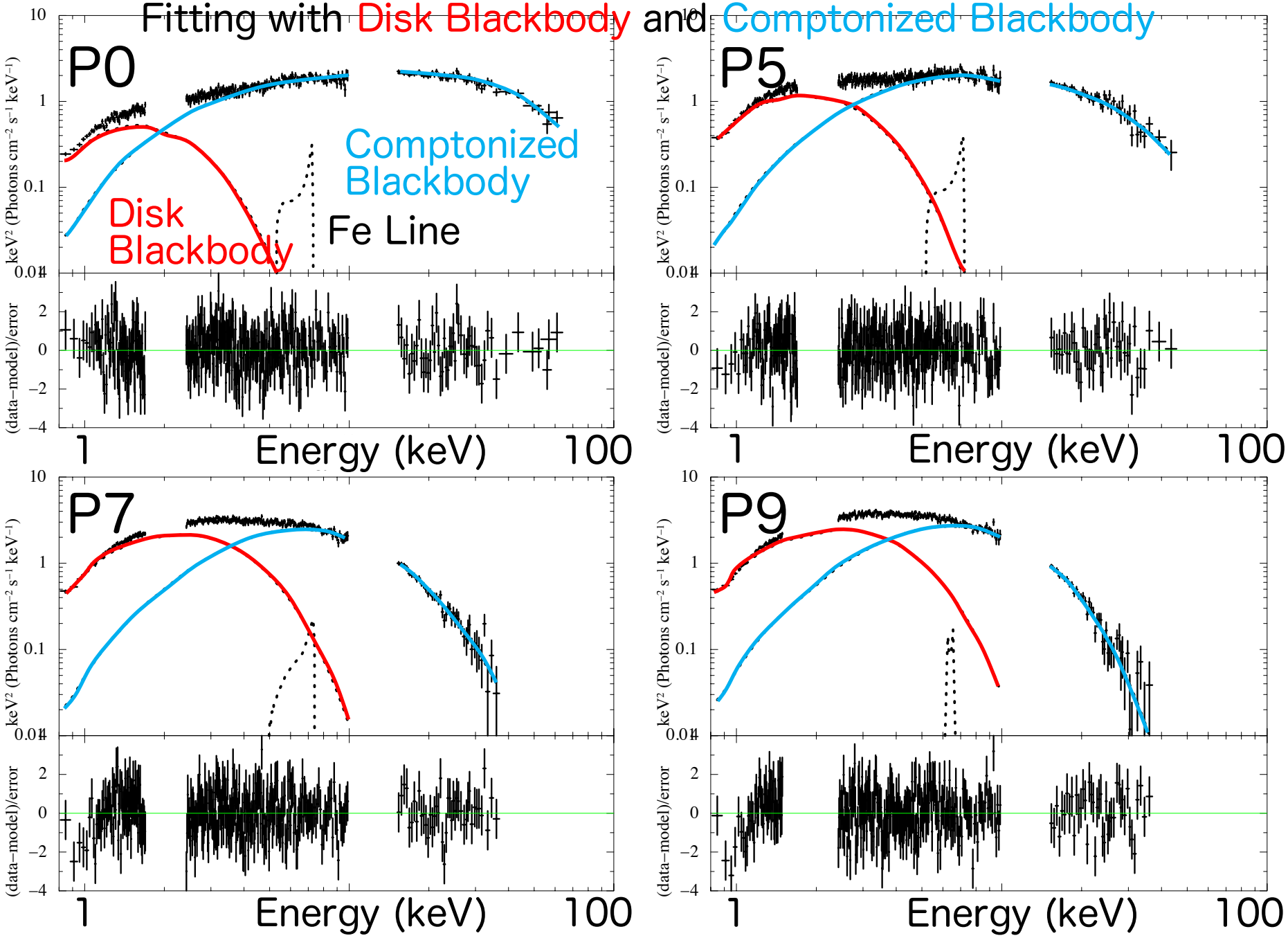
- The soft and hard state are explained by an accretion disk, and a blackbody Comptonized weakly and strongly, respectively.
- However, how about in between them?



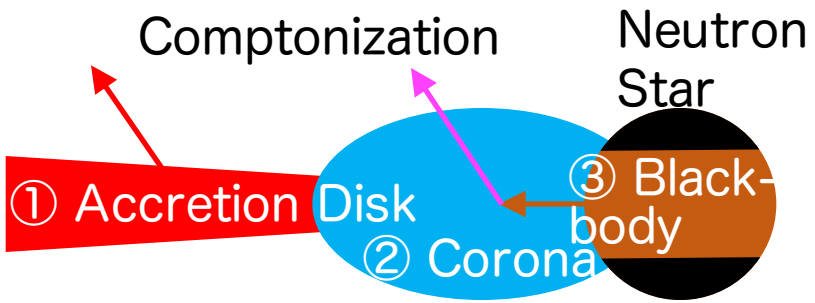
Aquila X-1:

- Recurrent transient
- Observed with Suzaku on 2011 October 21.
- Hard-to-soft state transition took place during the observation, on ~20 ksec.




Fitting with Disk Blackbody and Comptonized Blackbody
P0
P5
P7
P9
Comptonized Blackbody
Disk Blackbody
Fe Line
keV² (Photons cm⁻² s⁻¹ keV⁻¹)
(data−model)/error
Energy (keV)
1
100
10
1
0.1
0.01
2
0
−2
−4

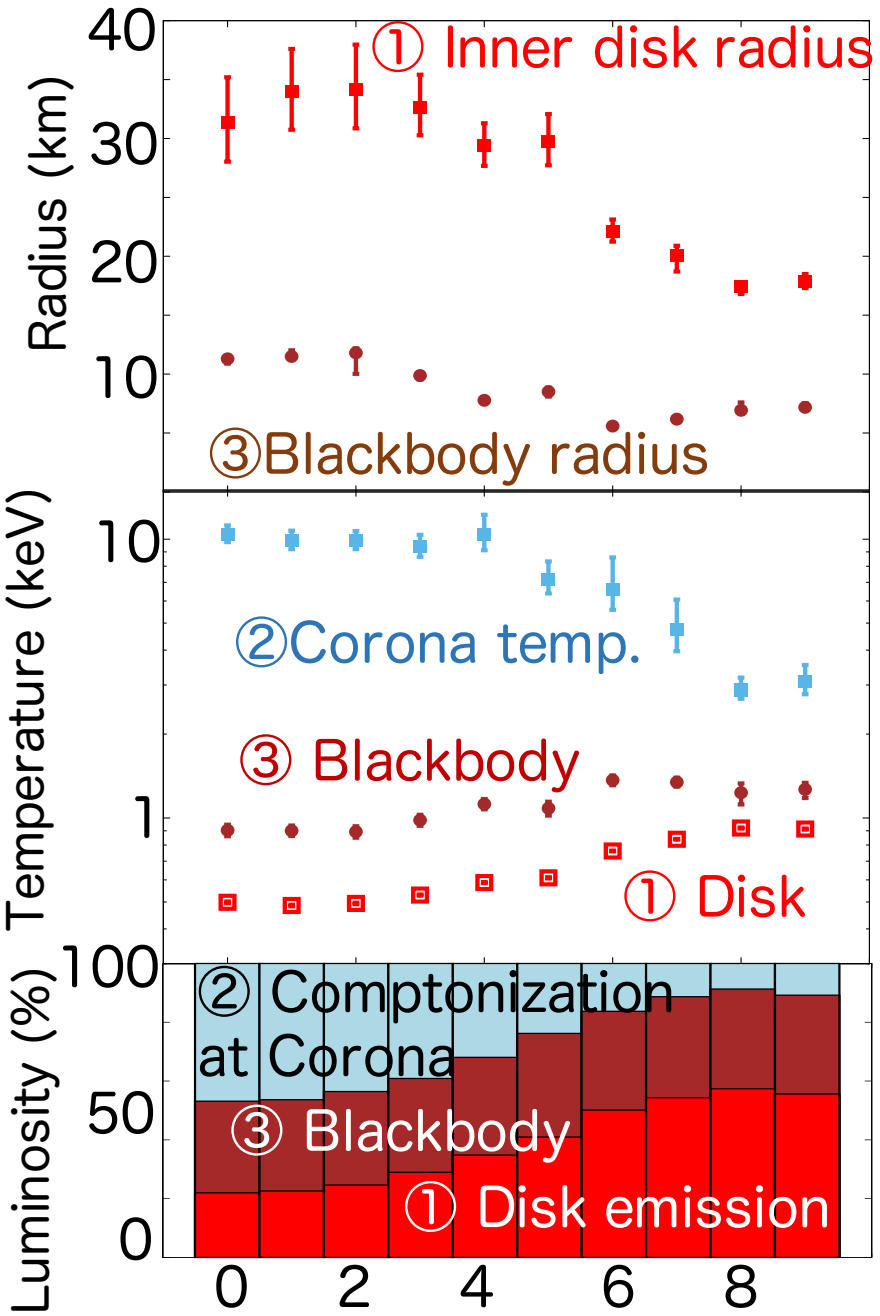
Discussion & Conclusion



① The opt. thick disk continues closer to the NS

② Corona shrinks, becomes cooler (~3 keV), and less luminous

③ Blackbody gets confined to the equator



Parameters in the two states are connected continuously.

This justifies the spectral decomposition, Disk, Corona and Blackbody, throughout both states.

$B<10^8$ G, assuming $R_A<10$ km at P0-P9