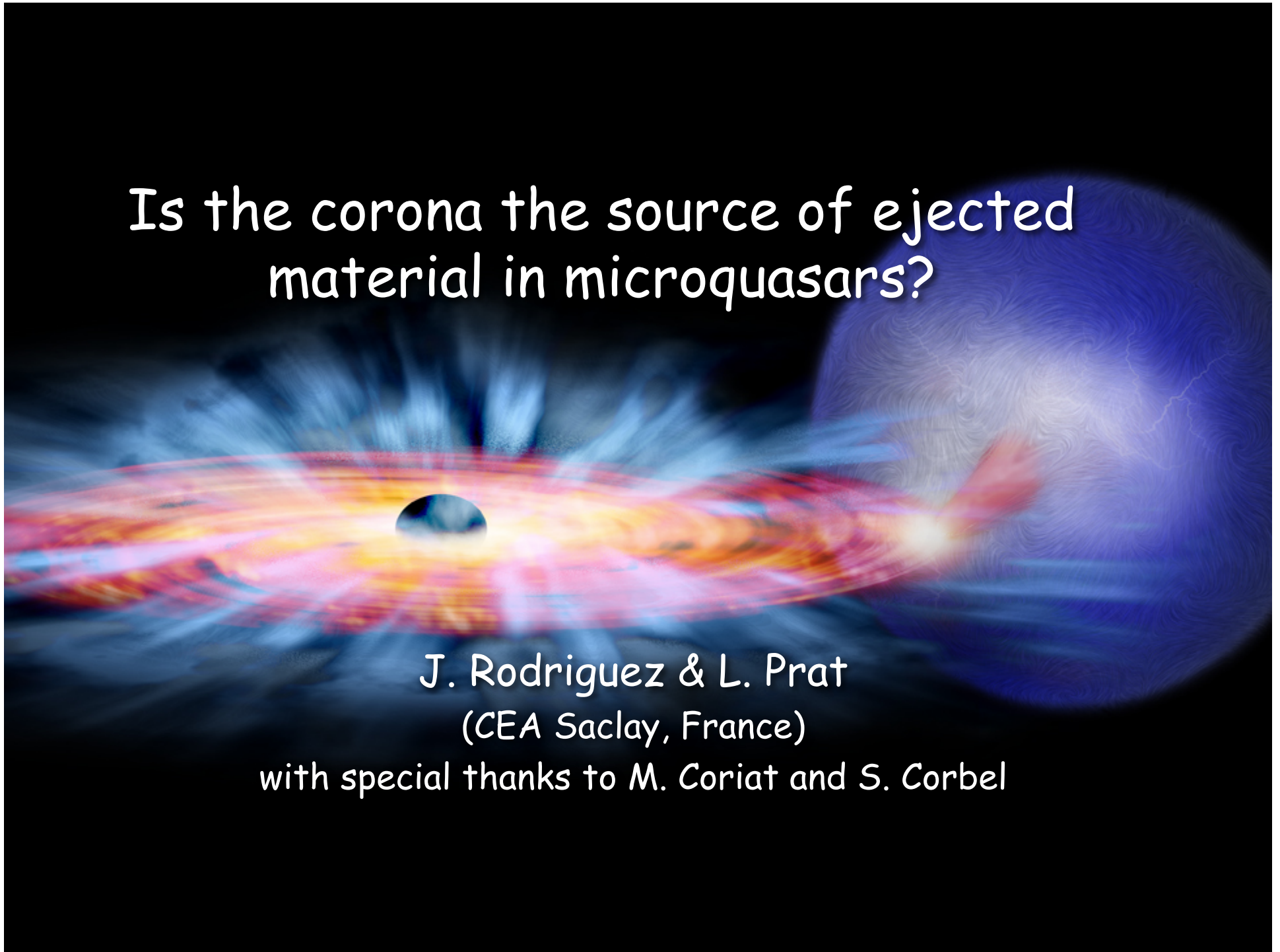


Is the corona the source of ejected material in microquasars?

J. Rodriguez & L. Prat
(CEA Saclay, France)

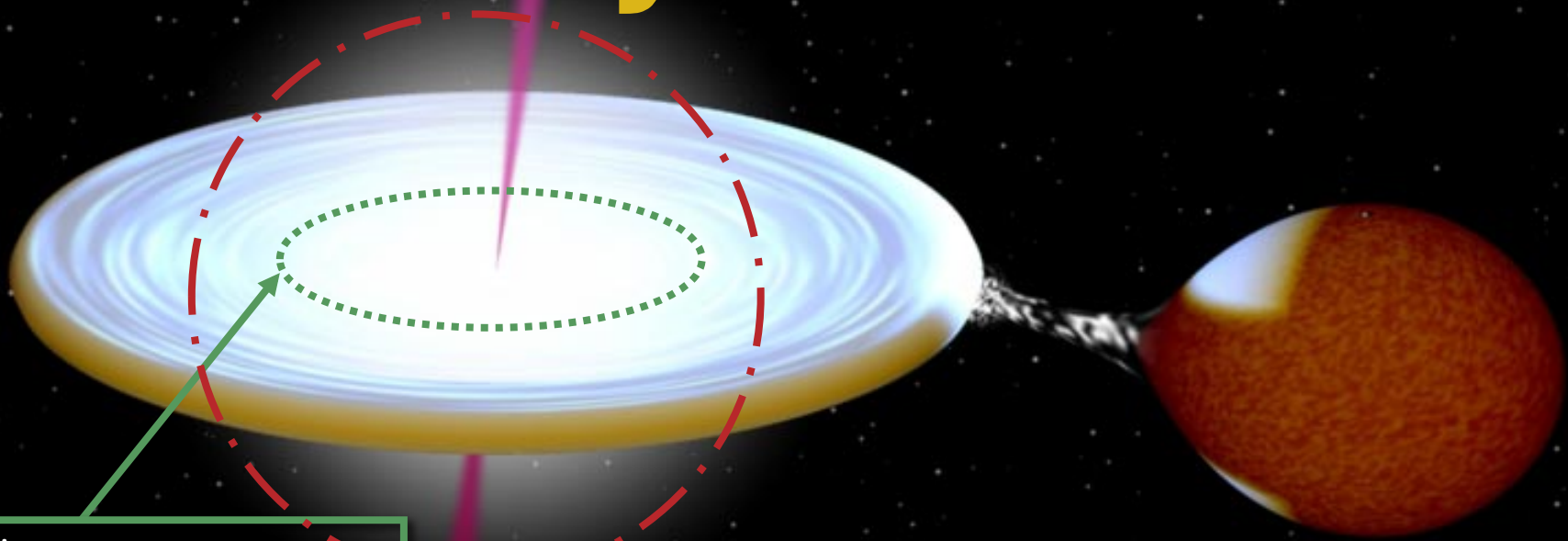
with special thanks to M. Coriat and S. Corbel



Summary

- ✧ Microquasars
- ✧ Accretion-ejection connections
- ✧ Beyond the phenomenology: physics of outbursts
- ✧ Conclusions

Microquasars and diagnostics



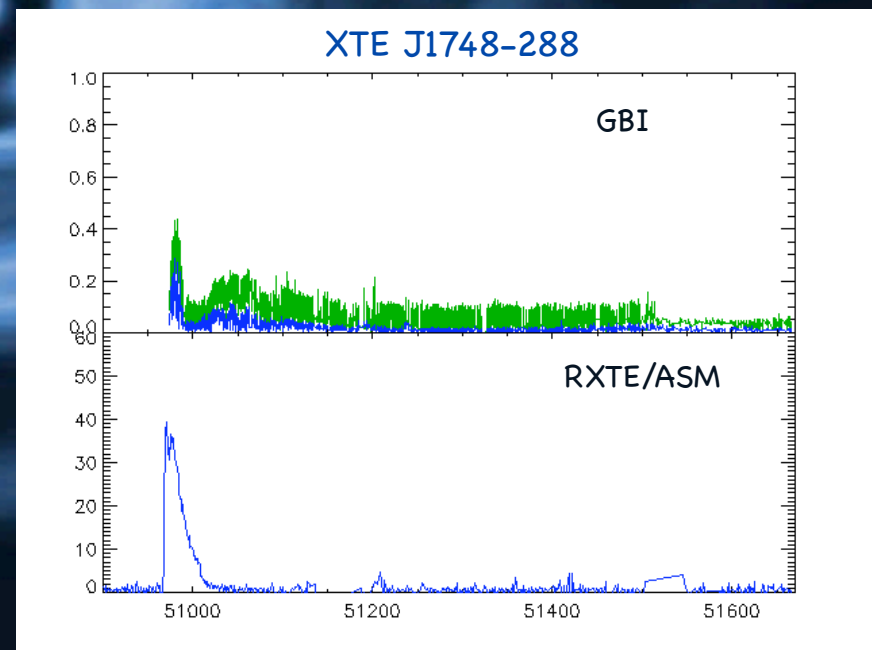
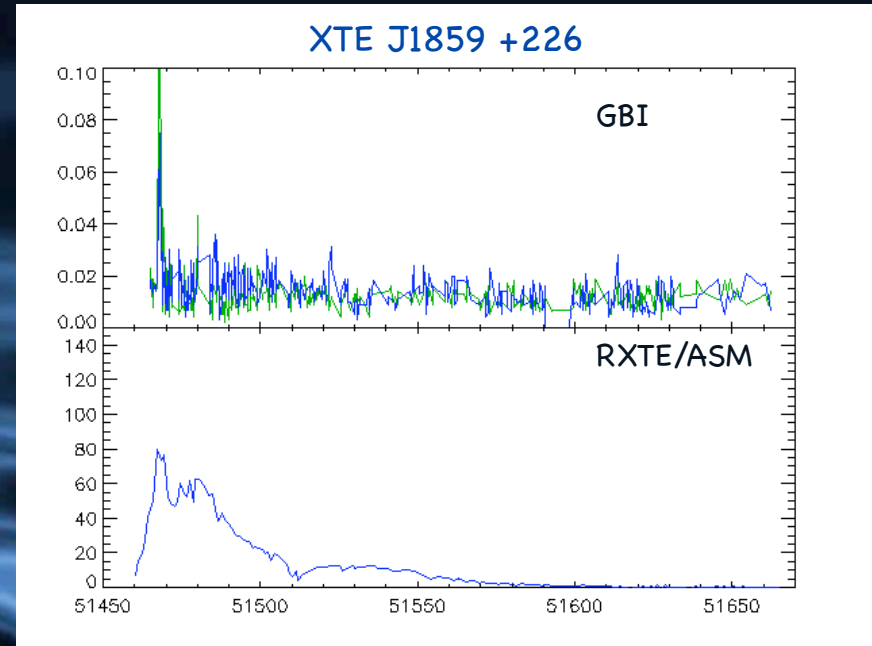
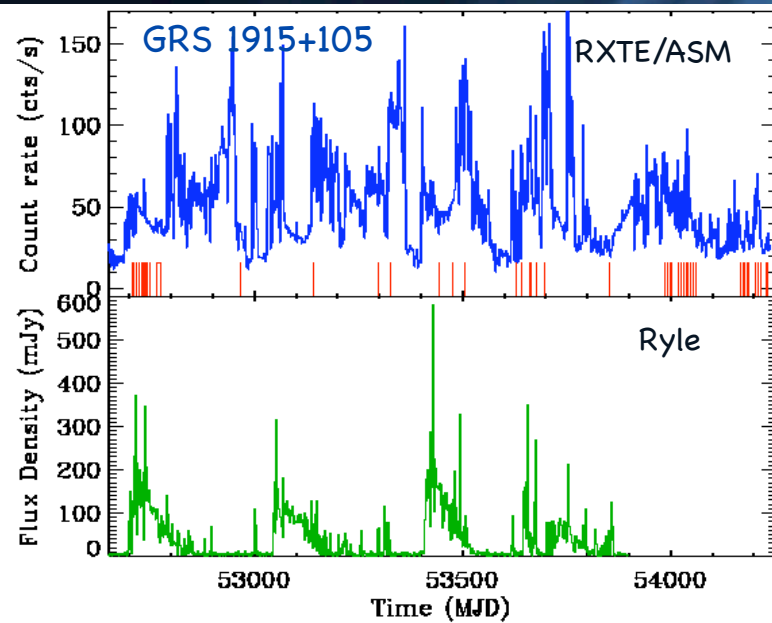
Self-absorbed or not Synchrotron:
large $\lambda \rightarrow$ IR/Visible

Thermal emission: BB ~ 1
keV

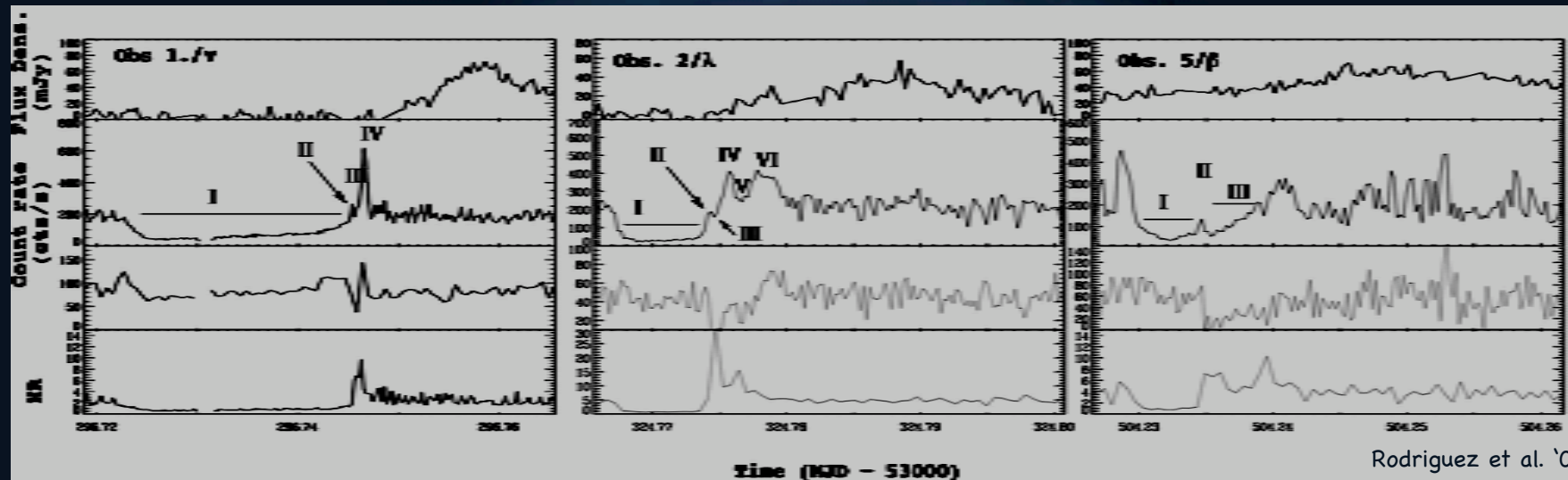
Non-thermal emission: inverse
Compton or Synchrotron: 10
keV-1 MeV

Timing "Noise", LF & HF QPO: global
movement of disc? Of corona? Other
mechanism(s)?

Microquasars in outburst

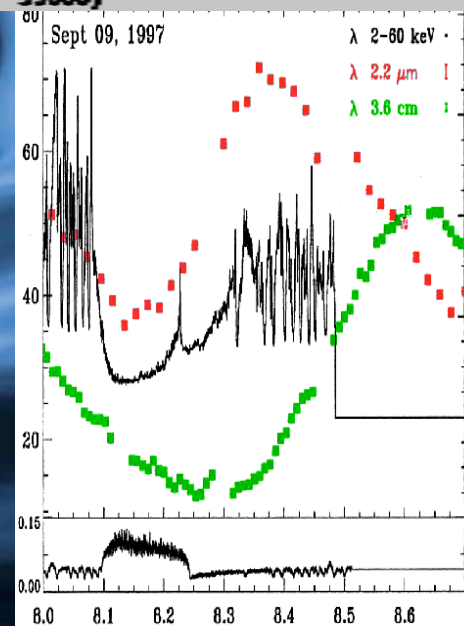


Accretion-ejection connections



Rodriguez et al. '08

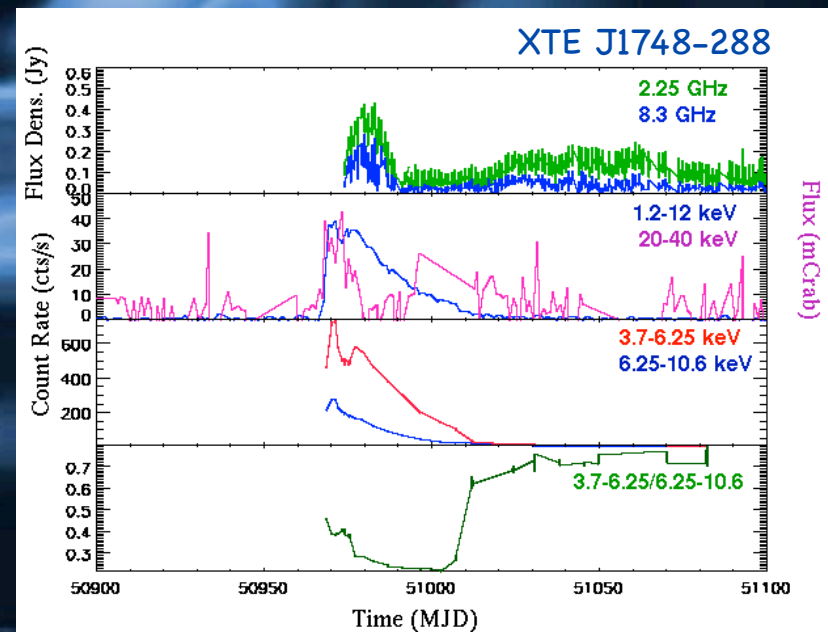
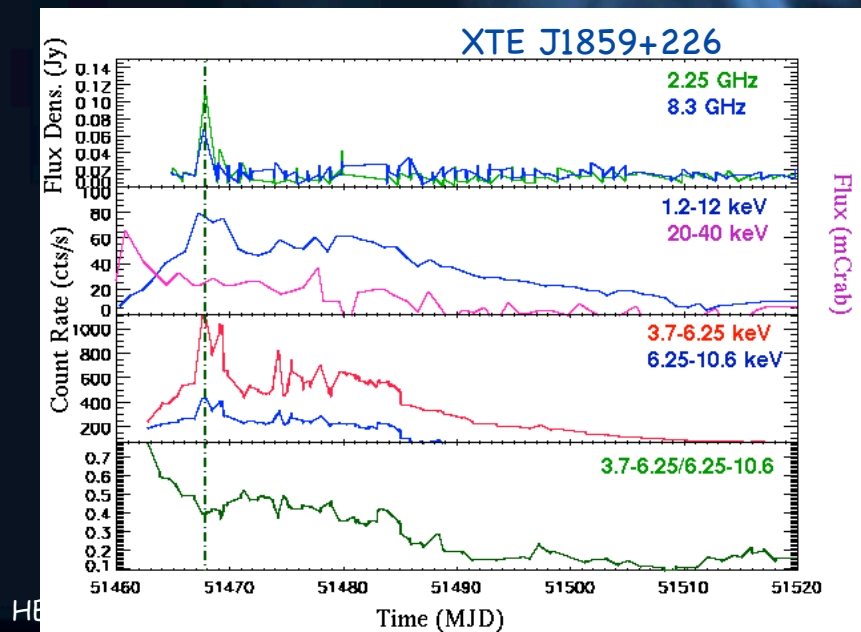
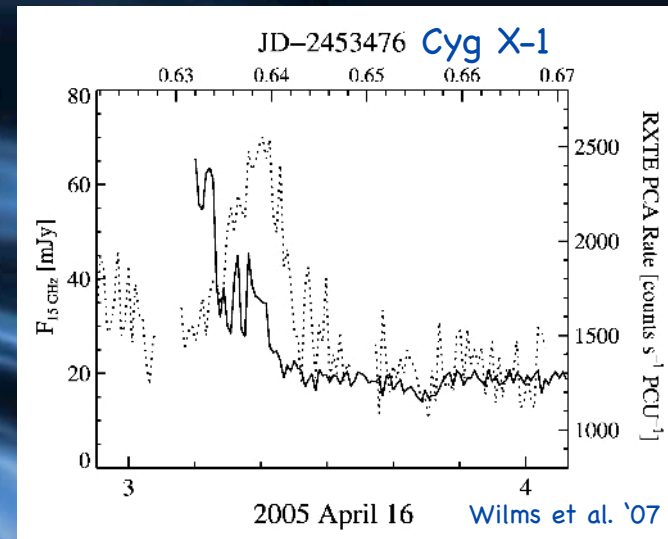
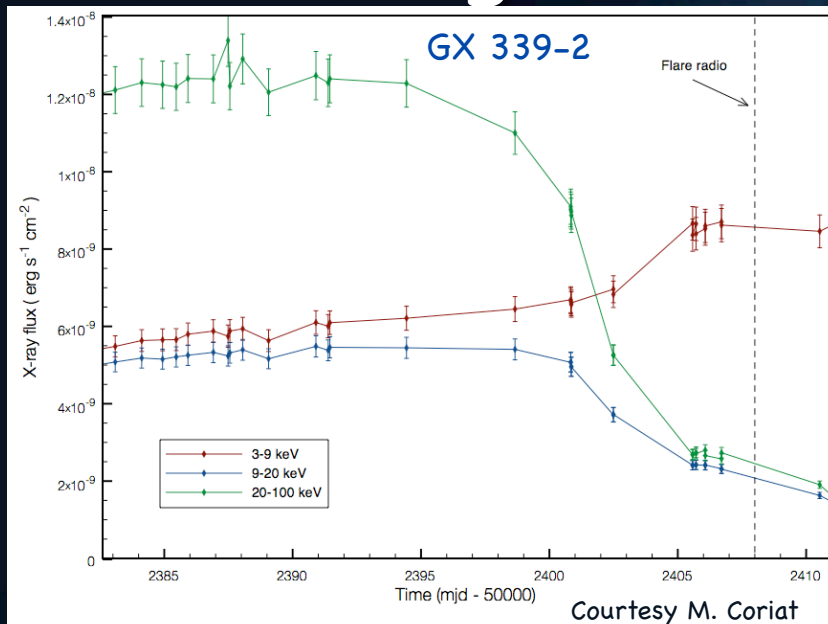
- ✧ RXTE+IR+Radio => 1st direct link between accretion and ejection (Mirabel et al. '98)
- ✧ INTEGRAL+Ryle: Ejection always follows sequence of spectrally hard dip ended by sudden spike (R. et al. '08)



Mirabel et al. '98

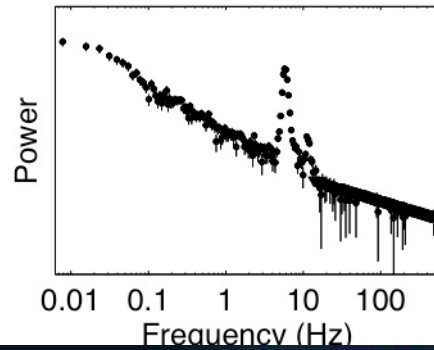
See Poster by L. Prat

Towards a general picture?

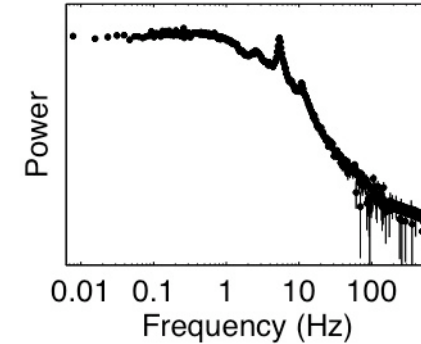


A model-independent view

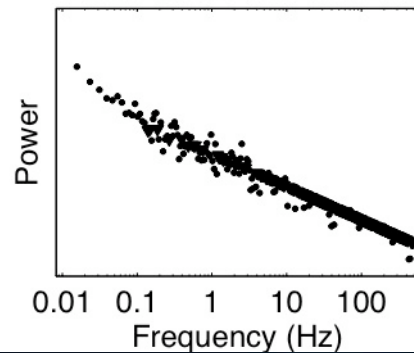
Soft Intermediate



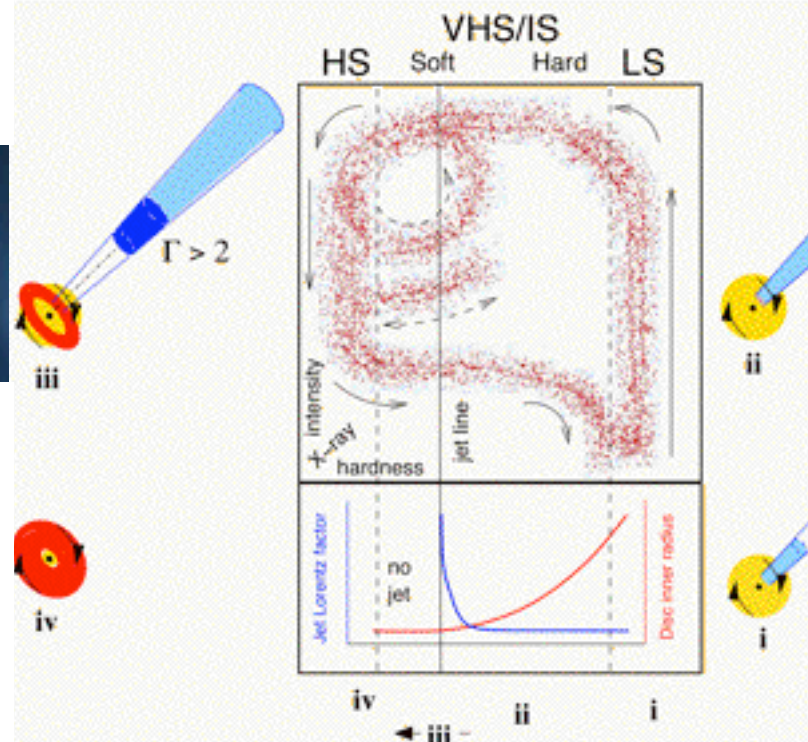
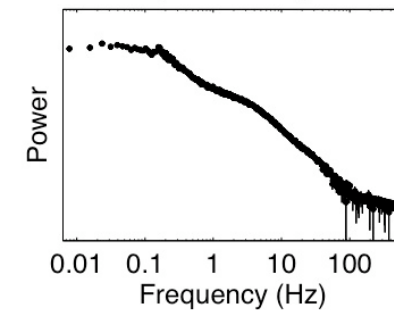
Hard Intermediate



High/Soft

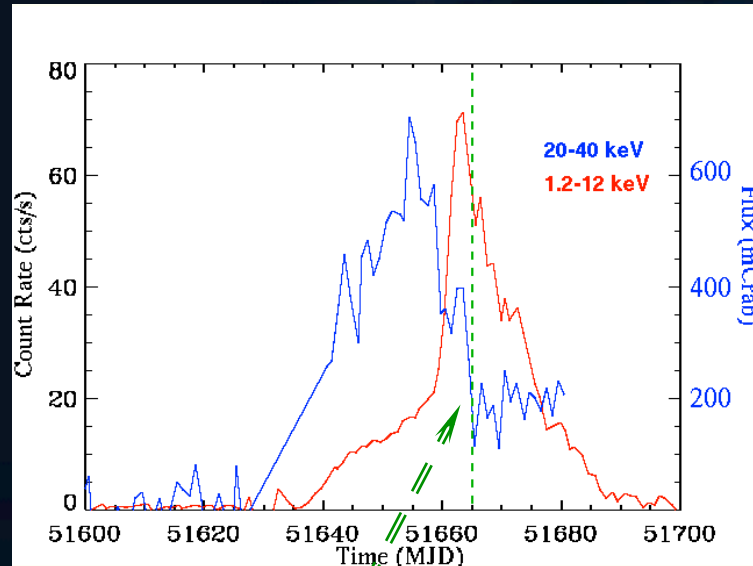


Low/Hard



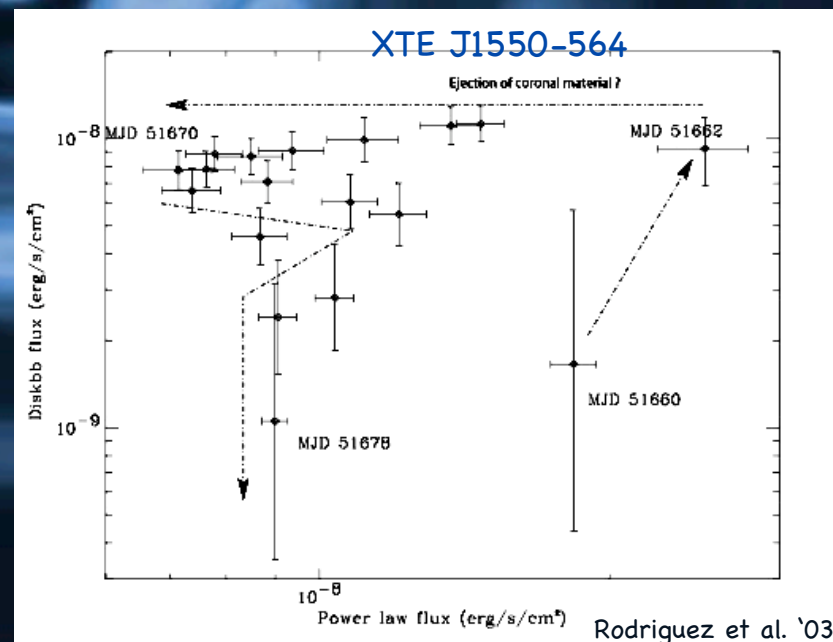
Fender et al. '05; Homan & Belloni '05; Remillard & Mc Clintock '06

Beyond the phenomenology: ejection of coronal material?

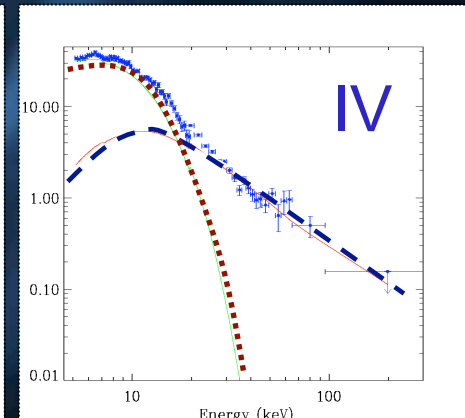
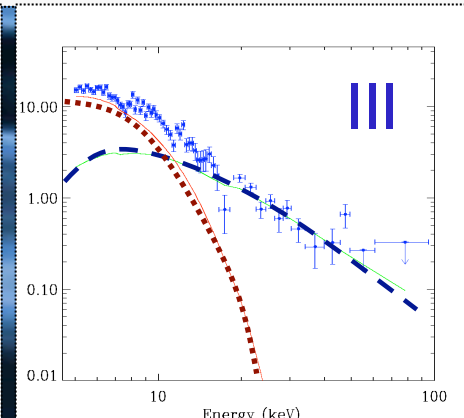
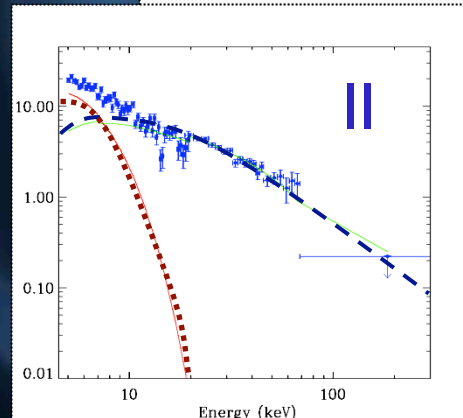
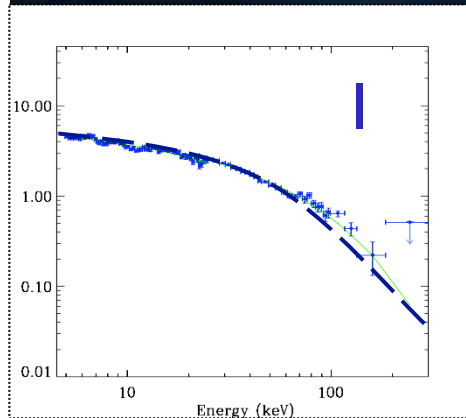
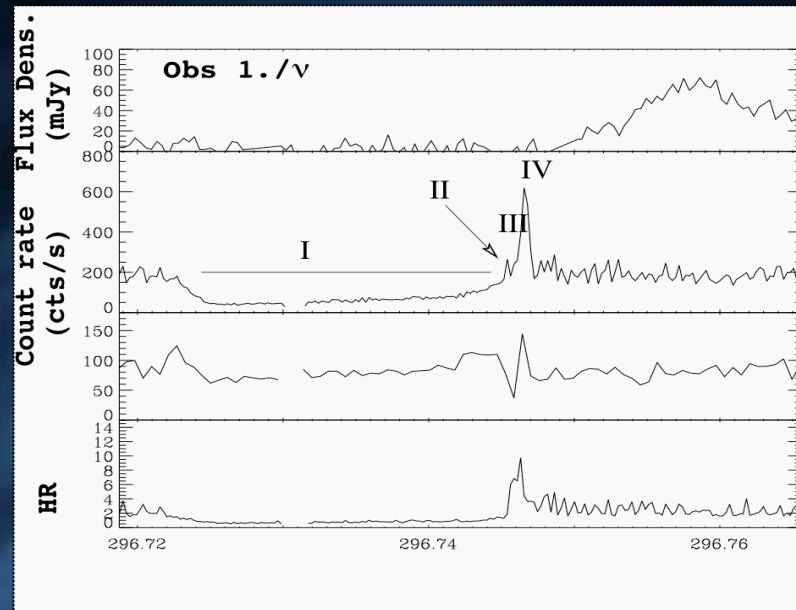


Radio detection with
ATCA (Corbel et al. '01)

Fits to X-ray data:
⇒ Behaviour and flux of
various spectral
components during
outbursts

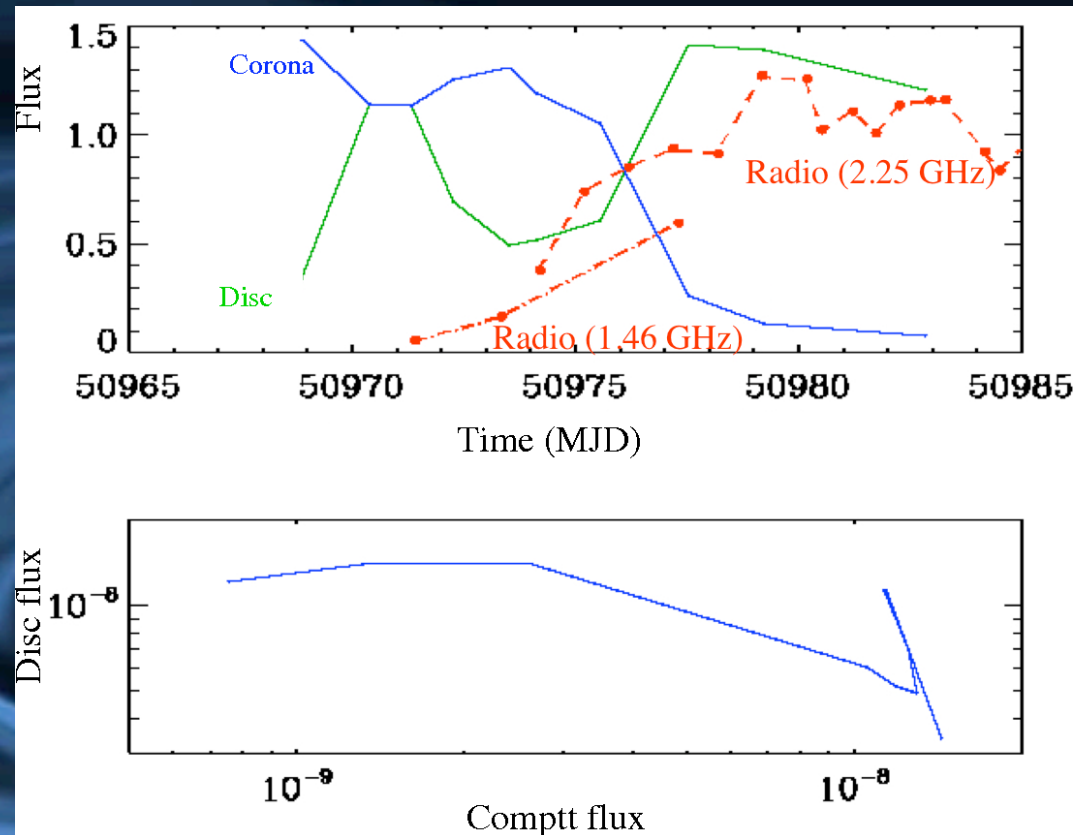
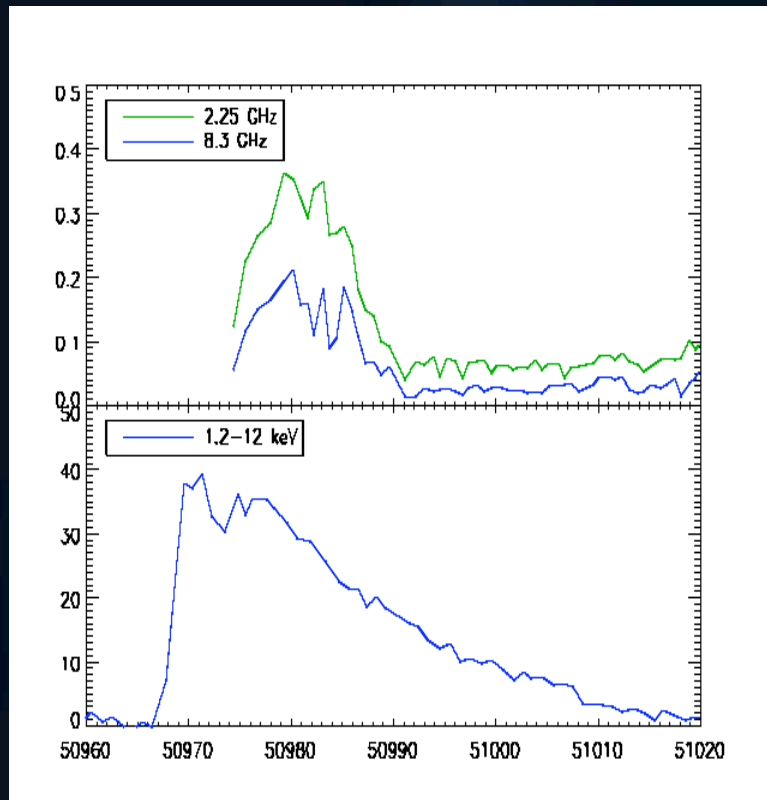


GRS 1915+105



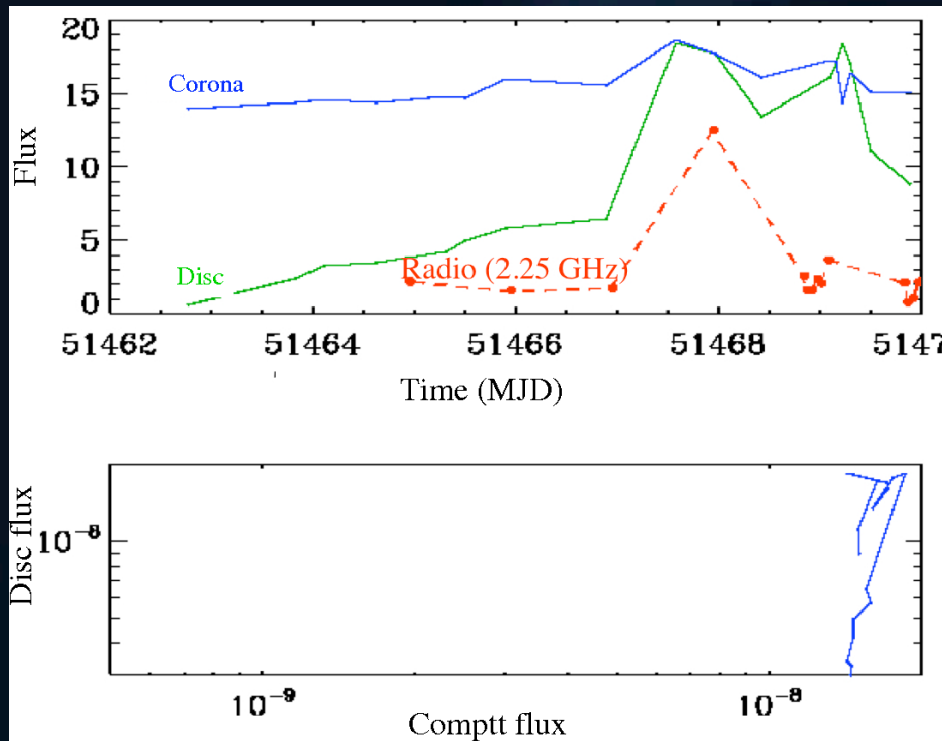
Approach of disc + Compton component shrinks
between II and III (R. et al. '08)

XTE J1748-288



- ✓ Initial decrease of comptt flux before first radio detection: but only two pointed observations
- ✓ Complex morphology of radio outburst, multiple flares after large decrease of comptt flux

XTE J1859+226

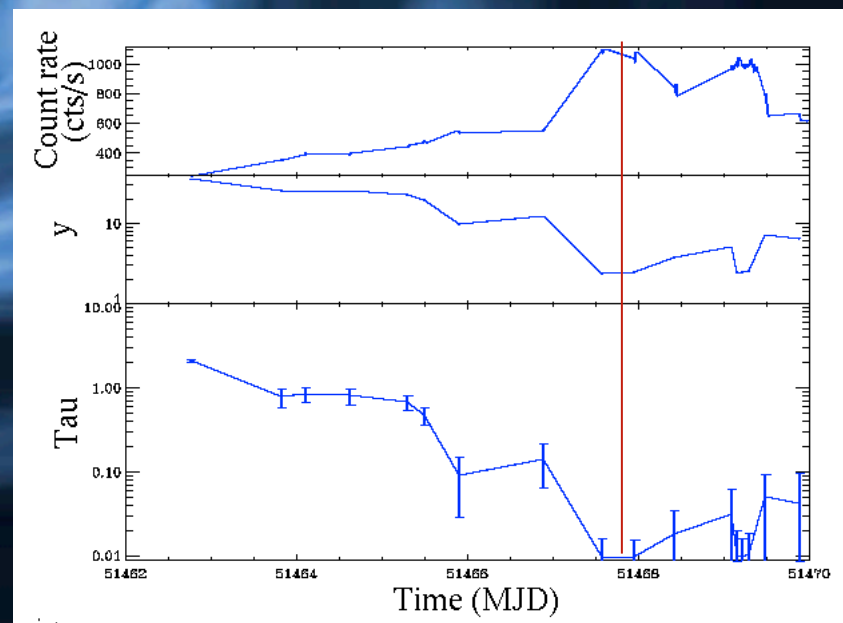


Evolution of fluxes
not conclusive

However:

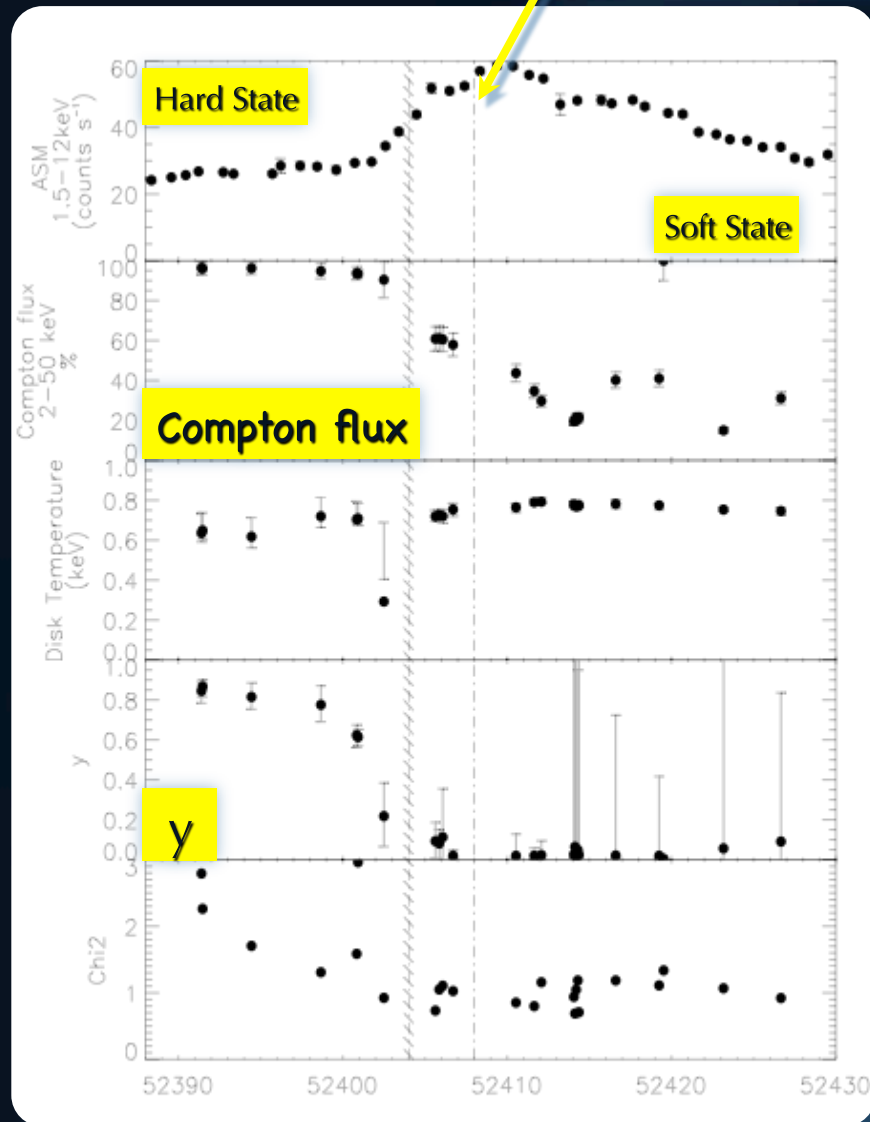
$$\gamma \propto kT_e \max(\tau, \tau^2)$$

With $\max(\tau, \tau^2) \propto \rho R$, mean number
of scattering \Rightarrow factor 10



GX 339-4

Radio Flare

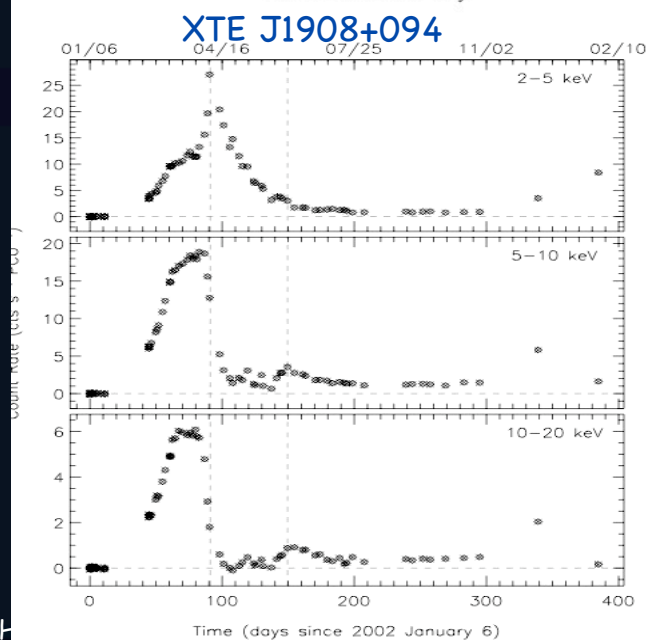
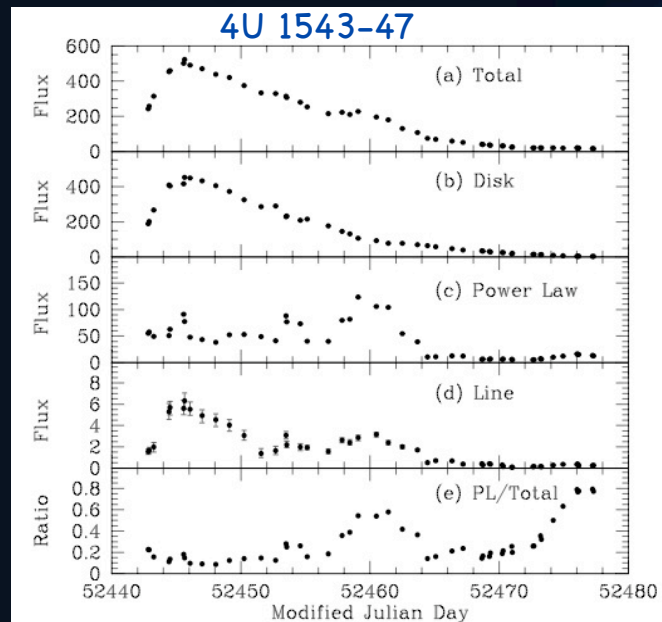


- ◇ Compton flux \searrow before radio flare
- ◇ γ shrinks before radio flare \Rightarrow decrease of coronal density
- ◇ Disc remains \sim stable

Conclusions

- ✧ Evolution of fluxes: Possible ejection of the corona pretty clear in 3 sources (1550-564, 1915+105, GX339-4): **coronal flux shrinks before the ejection**
- ✧ Fluxes not conclusive in 1748-288 and 1859+226
- ✧ Physical properties of corona: in 1915+105, 1748-288, 1859+226, and GX 339-4: Comptonisation still in action after ejection, but physical properties of the corona drastically change: **ρxR shrinks \Leftrightarrow (partial) ejection of coronal material**
- ✧ $\tau \searrow$ in GX 339-4 (2007, Caballero-Garcia et al. '09), and H1743-322 (Joinet et al. 2005) before detection of ejection

The future



Several other candidates:

- ✧ H1743-322/IGR J17464-3213
- ✧ 4U 1543-47
- ✧ XTE J1908+094
- ✧ GRO J1655-40
- ✧ Cyg X-1 ?
- ✧ Cyg X-3 ?
- ✧ Aql X-1 ?

