MODELING MAXI J1836-194 COMPACT JET
USING DISK-DRIVEN SHOCKS

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INTRODUCTION

Astrophysical jets are very collimated ejection of matter observed in systems that accrete matter such as compact objects. However, up to now, the mechanisms at the origin of these outflows are poorly understand.

– **Objective** : **Model the multi-λ emission of MAXI J1836-194 compact jet with ISHEM** [1]

$\longrightarrow$ using 5 data sets taken during its 2011 outburst

– **Methods** : Internal shock model driven by the accretion flow variability (X-ray variability)

- Obtain the best fits of the multi-λ data with physically correct parameters
- Explain the jet spectral evolution with a minimum of variable parameters

INTERNAL SHOCK MODEL

Internal shock model $\Rightarrow$ shocks between shells of matter at the origin of the jet emission

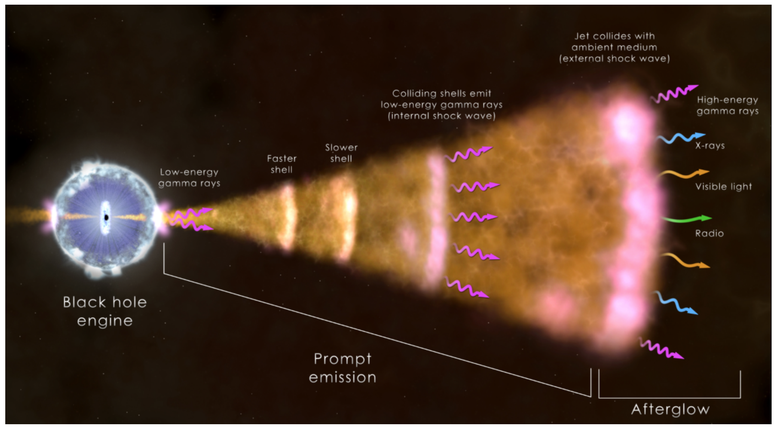

Figure 1: Artistic impression of a GRB (NASA)

Shape of the spectra determined by the fluctuations of the jet velocity !

– **Problem** : **How to launch shells of matter** ?

– **Hypothesis** : **Strong relation between accretion flow** & **base of the jet**

$\Longrightarrow$Variability at the base of the jet = X-ray variability of the disk !

MAXI J1836-194

Black hole candidate discovered during an outburst in 2011.

–**Why interesting** ?

- Quasi-simultaneous observations [2]:
  VLA (Radio), VLT (IR), Faulkes Ts (Opt.), Swift & RXTE (X-rays)
- Numerous data sets
  5 obs. at different levels of luminosity
- Jet dominates from radio to IR
  No disk "pollution" in IR!

$\rightarrow$ **Hard state**: Sep 03, Oct 12 & Oct 27 & **Hard-intermediate state**: Sep 17 & Sep 26

RESULTS

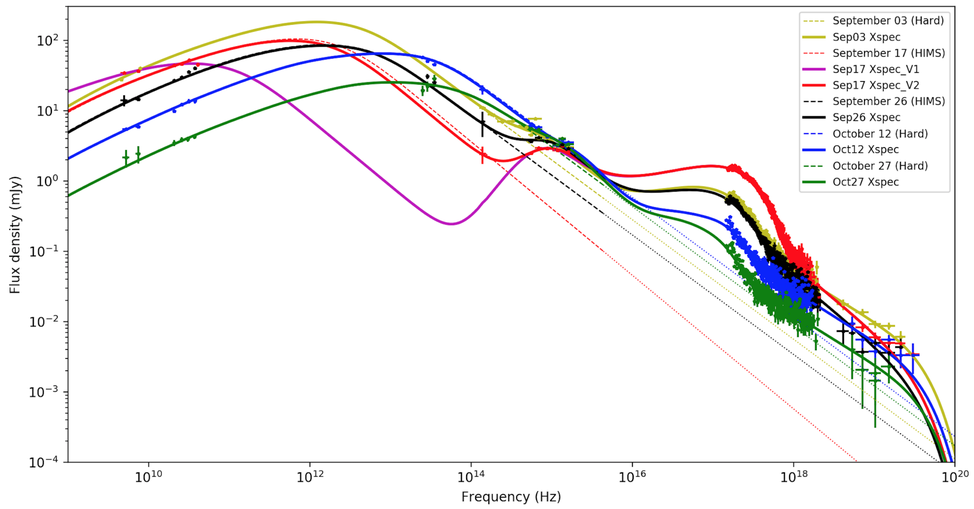

Figure 2: Resulting jet SEDs with accretion disk fits. (Péault et al, in prep)

- Model successfully match data points : χ^2 from 0.82 to 1.28
- Evolution explained with only 2 parameters : Jet power and $\gamma_{\rm MOY}$
- Jet power and $\gamma_{\rm MOY}$ $\nearrow$ with the source luminosity $\Longrightarrow$ in accordance with previous interpretations [3]

MAIN PARAMETERS

DISTANCE | INCLINATION — SOURCE

INDEX | $\gamma_{\rm MIN}$ — ELECTRON POWER LAW

JET POWER | OPENING ANGLE | $\gamma_{\rm MOY}$ — JET

FUTURE RESEARCH

- Add Compton processes
- In-depth study of the cooling of e-

REFERENCES

[1] Malzac. *MNRAS*, 443:299–317, 2014.

[2] D. M. Russell et al. *APJL*, 768:L35, 2013.

[3] T. D. Russell et al. *MNRAS*, 450:1745–1759, 2015.