MODELING MAXI J1836-194 JET EMISSION

USING THE ACCRETION FLOW VARIABILITY

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Journée des thèses

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MY SUBJECT

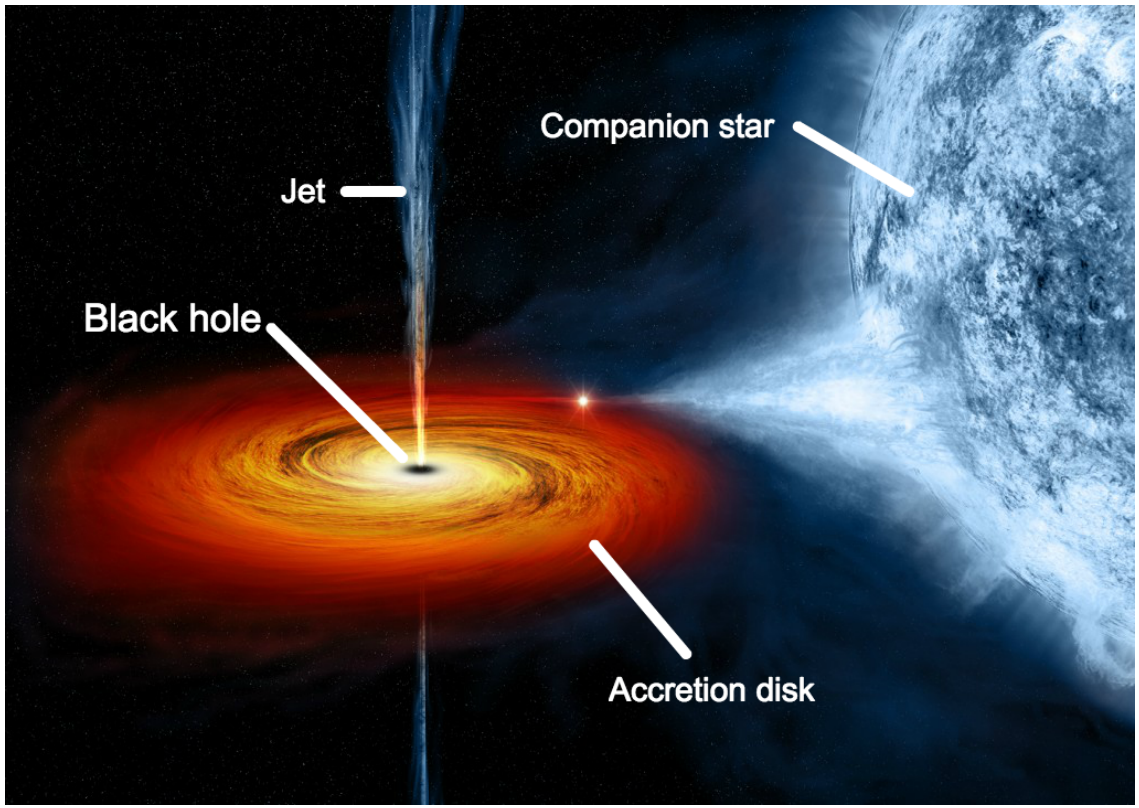
Subject : Multiwavelength emission of relativistic jets

MY SUBJECT – ASTROPHYSICAL JETS

Subject : Multiwavelength emission of relativistic JETS

Observed in:

Active galaxies
Star in formation
X-ray binaries, ...



Artistic view of an X-ray binary

MY SUBJECT – RELATIVISTIC JETS

Subject : Multiwavelength emission of RELATIVISTIC jets

Relativistic jets:

- Velocities close to c
- Black holes or Neutron Star
  $\rightarrow$ *Quasars*, *microquasars*

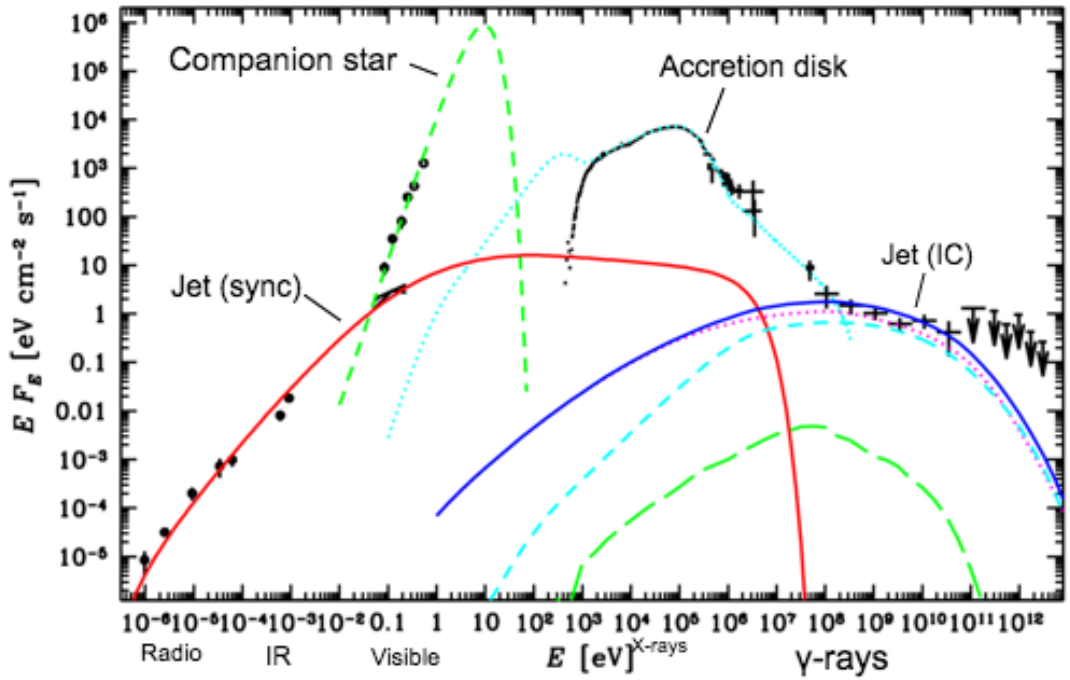
Messier 87 (Hubble, NASA)

MY SUBJECT – MULTI-λ EMISSION

Subject : MULTIWAVELENGTH EMISSION of relativistic jets

From radio to γ-rays

$\rightarrow$ Especially Radio and IR



(Zdziarski et al. 2016)

Problem: Jets with v$\sim$c from obj. like black holes? mechanisms ?

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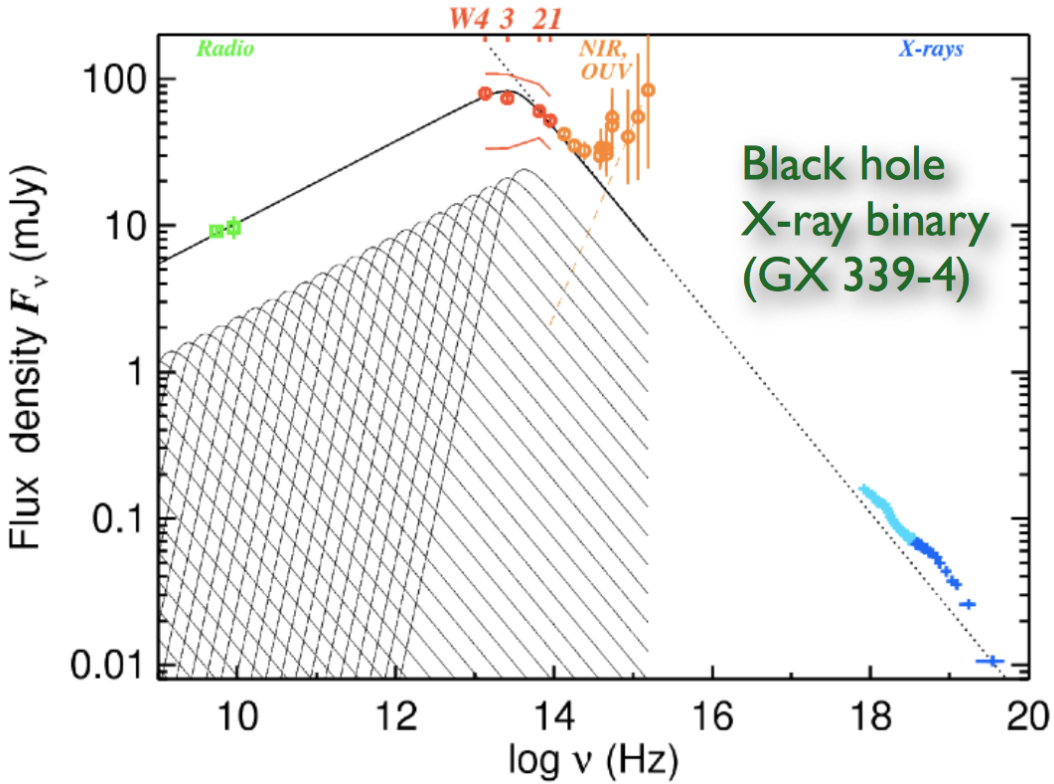


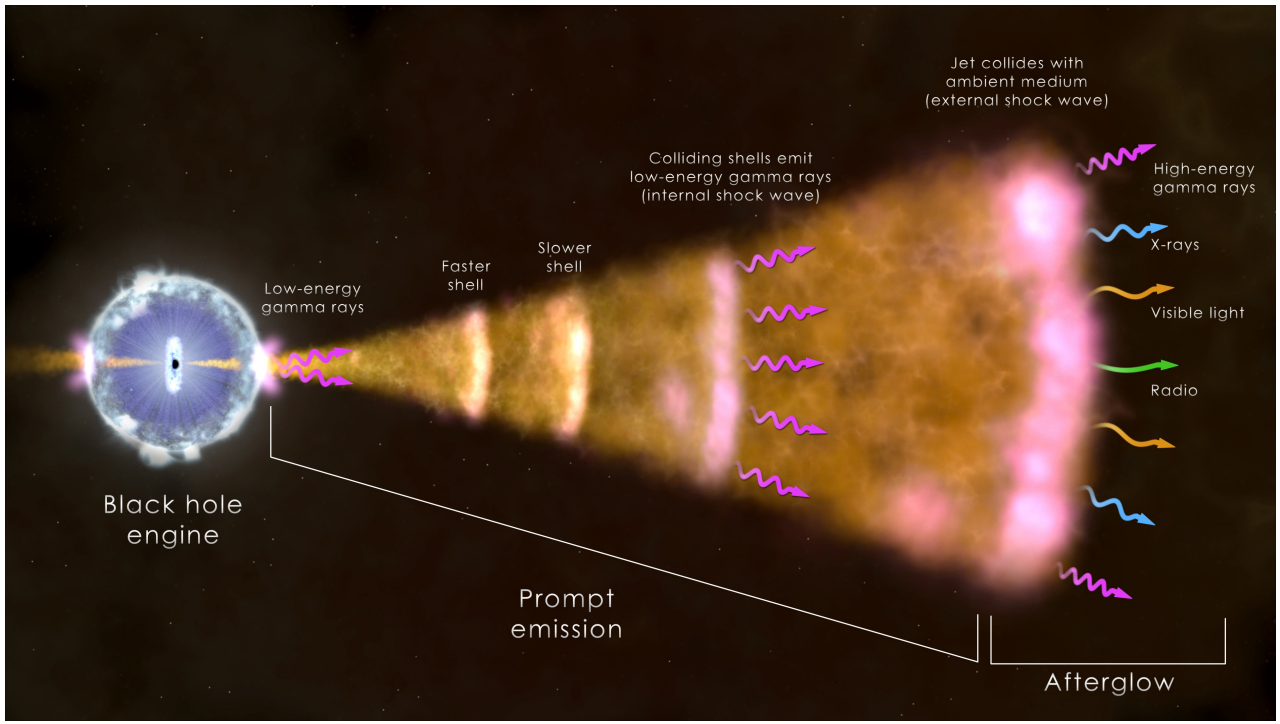
(Gandhi et al. 2011)

Problem: Jets with v$\sim$c from obj. like black holes? mechanisms ?

INTERNAL SHOCKS

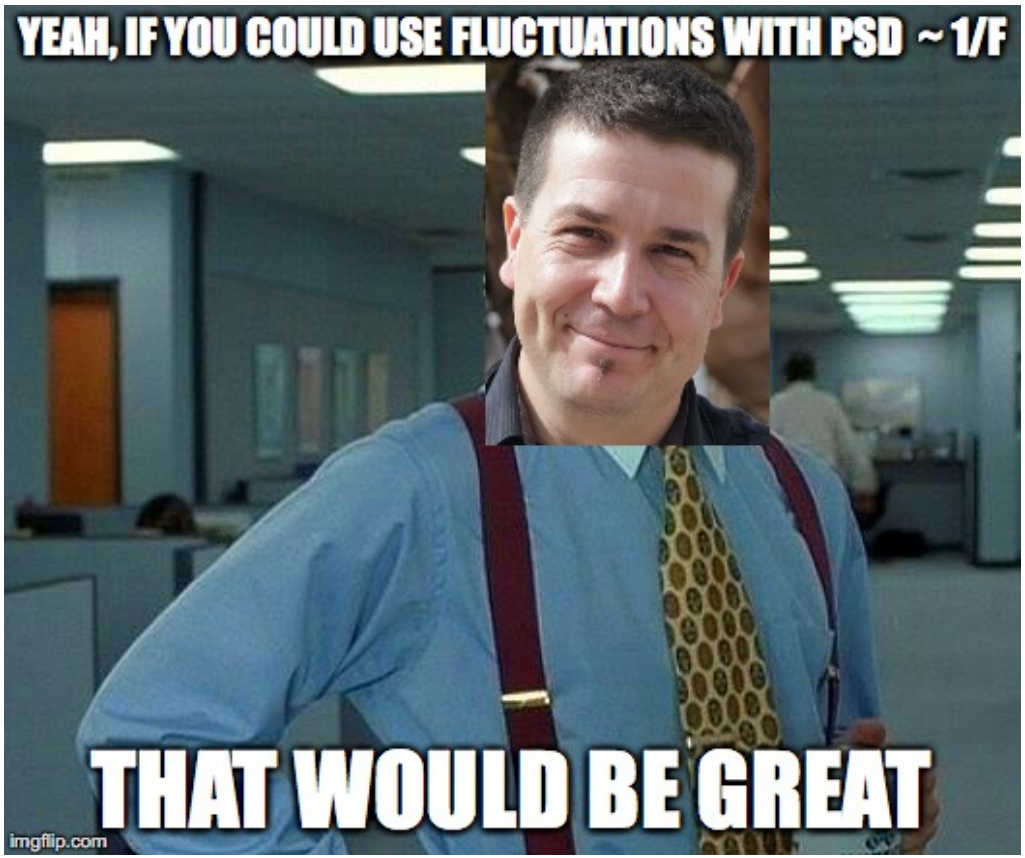
Solution: Gamma-ray burst model applied to X-ray binaries!

Internal shock model ⇒ shocks at the origin of the jet emission



(Description of a gamma-ray burst)

FLICKER NOISE FLUCTUATIONS



- Interestingly, can be found in the accretion flow variability!!!

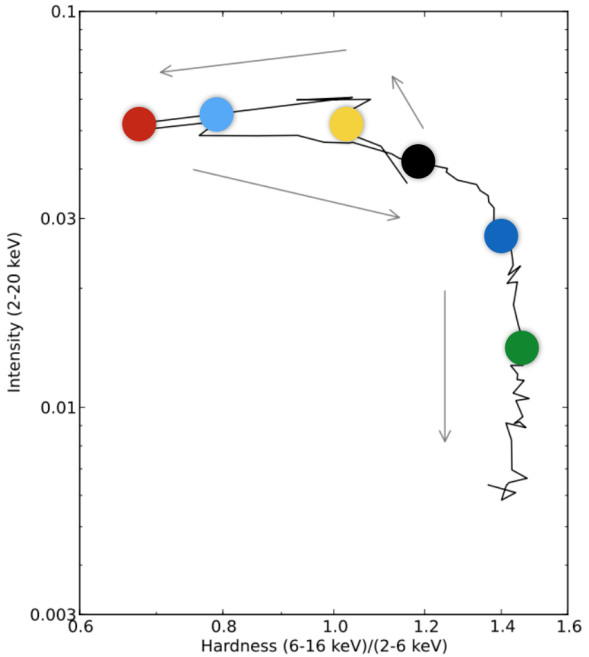
OBJECTIVE

Model the multi-λ emission of the jet in MAXI J1836-194

- BH transient discovered in 2011
  - Quasi-simultaneous observations :
    VLA (Radio), VLT (IR), Faulkes Ts (Opt.), Swift, RXTE (X-rays)
- Why interesting ?
  - Several data sets $\Rightarrow$ many data points!
    $\rightarrow$ Different levels of L, study the jet evolution
  - The disk is no dominant in IR

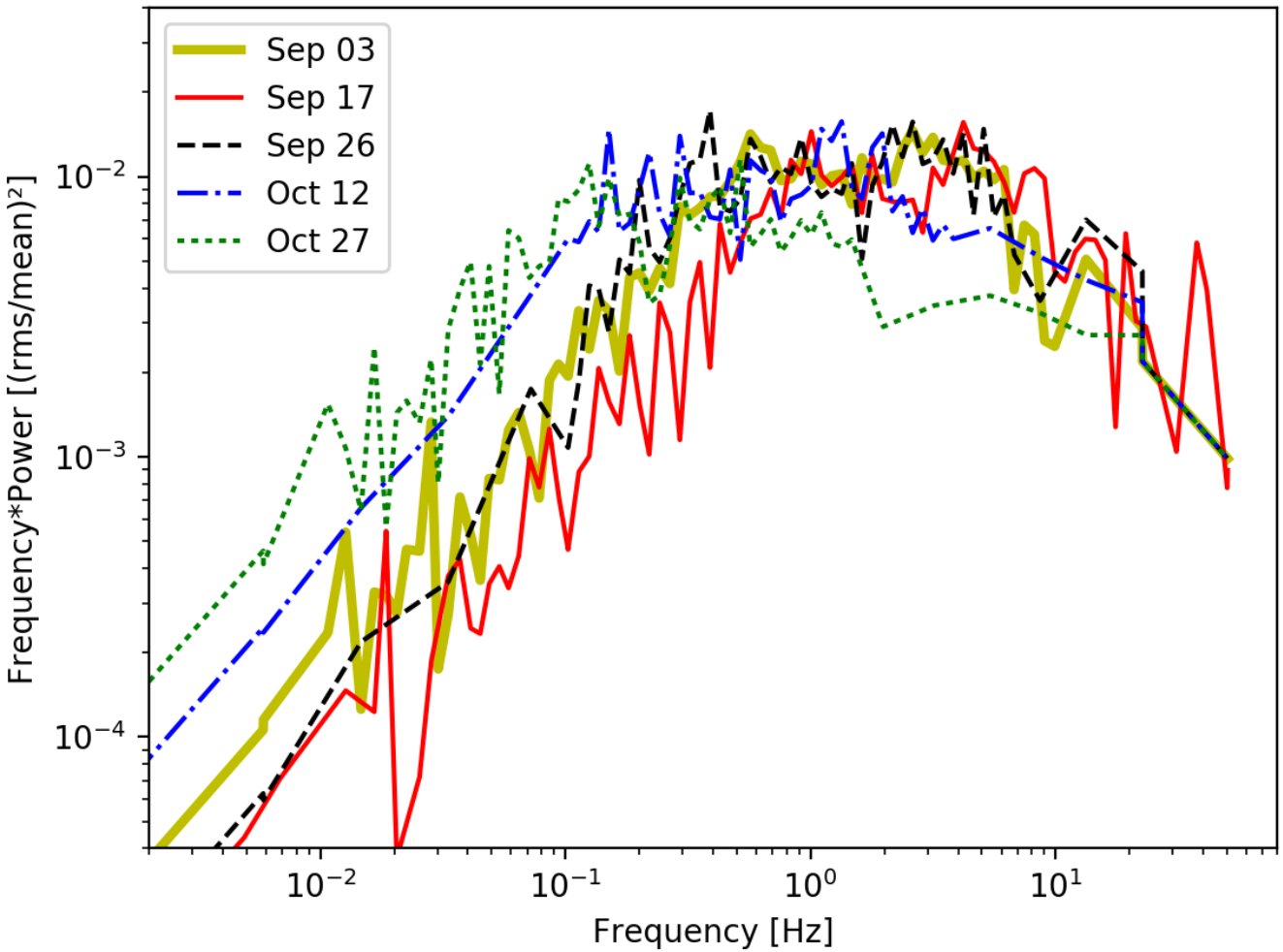
DATA SETS

- Data recycling: tracking the jet for 5 dates (not 6!)
  - Hard state: Sep 03 , Oct 12  & Oct 27 
  - HIMS: Sep 17  & Sep 26 



  - Reproduction of the 5 five jet spectra
    - Good spectral shape
    - A minimum of variable parameters
    - Most realistic parameters

POWER SPECTRA



MAIN PARAMETERS OF THE STUDY

Parameters	
Distance [4-10kpc] Inclination [4-15°]	$\Longleftrightarrow$ Related to the source
Index [2-3] Gamma min [?]	$\Longleftrightarrow$ Electron power law distribution
Jet power [$\leq$ 0.2 L_{EDD}] Opening angle [$\sim$ 1°] Mean Gamma [$\sim$ 2 ($<$?)]	$\Longleftrightarrow$ Jet properties

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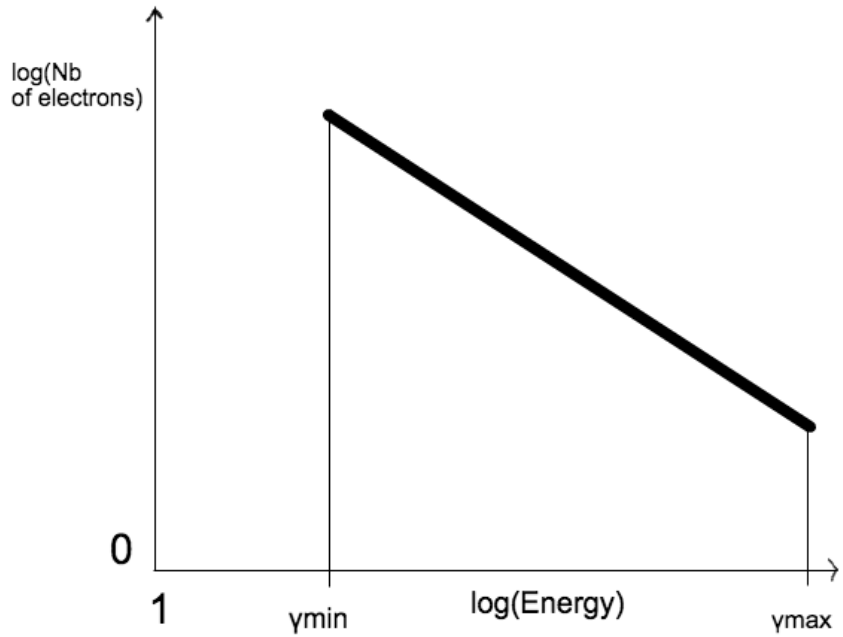
Gamma min [?]

Electron power law distribution



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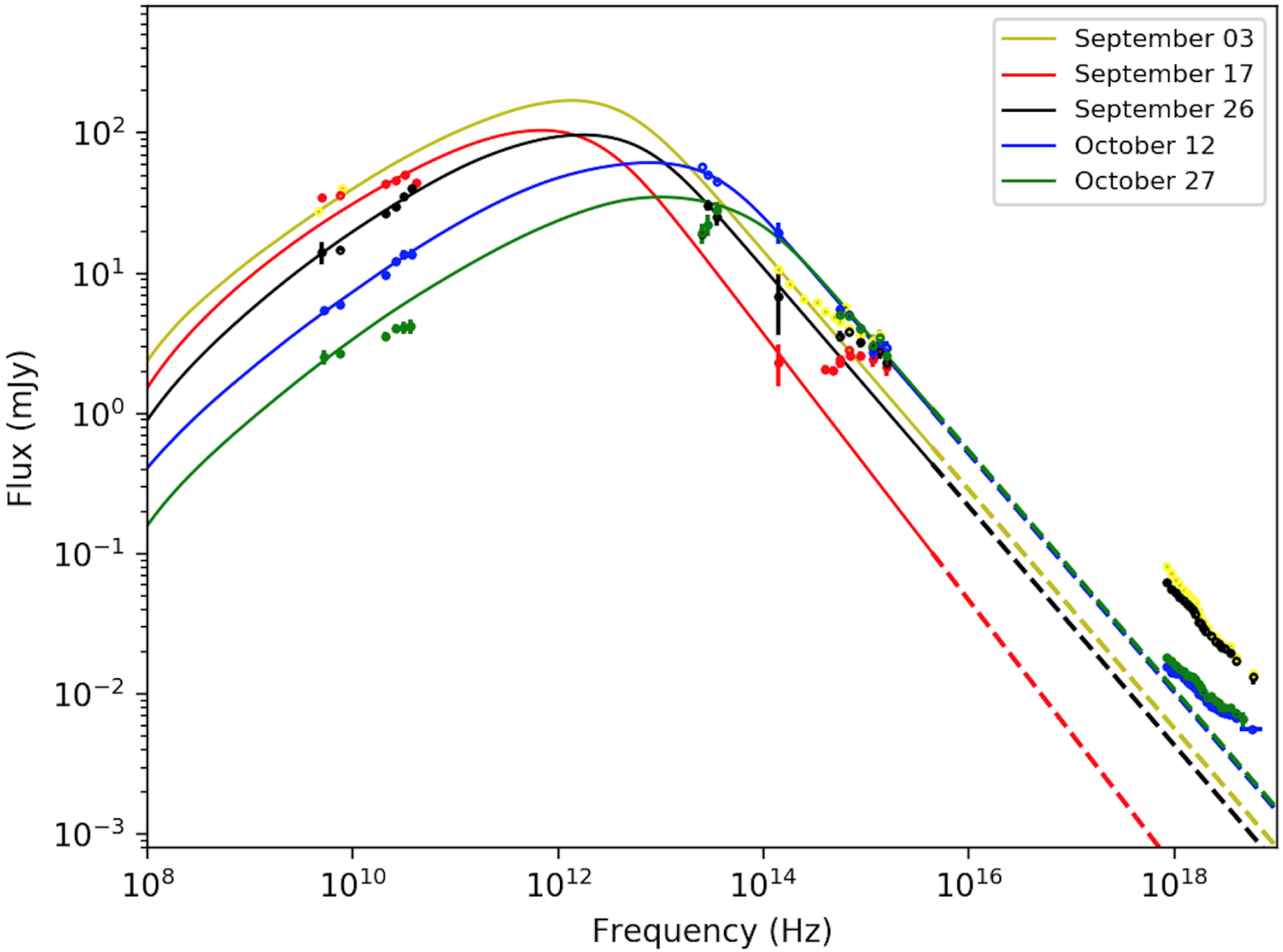
JET SEDS


September 03
September 17
September 26
October 12
October 27
Flux (mJy)
Frequency (Hz)
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{8}
10^{10}
10^{12}
10^{14}
10^{16}
10^{18}

FINAL PARAMETERS

Date	Dist	Incli	Index	γ_{min}	Jet power	Opening	γ_{moy}
	kpc				L_{EDD}		
Sep 03	4	8°	2.7	13	0.10	1°	9
Sep 17	4	8°	2.9	13	0.19	1.2°	13
Sep 26	4	8°	2.7	13	0.034	1°	6.5
Oct 12	4	8°	2.7	13	0.008	1°	2
Oct 27	4	8°	2.7	13	0.0032	1°	1.06

FUTURE WORK

- Near future
  - Paper in preparation
- Later: improve the code
  - Radiative cooling of e-
  - Inverse Compton emission: γ-rays