Gamma-ray from 3C 454 and LBL

V.Vittorini on behalf of the AGILE AGN WG
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Name	Affiliation
A. Bulgarelli	INAF-IASF Bologna
A.W. Chen	INAF-IASF Milano
F. D'Ammando	INAF-IASF Palermo
I. Donnarumma (*Co-Chair*)	INAF-IASF Roma
A. Giuliani	INAF-IASFMilano
F. Longo	INFN Trieste
L. Pacciani	INAF-IASF Roma
G. Pucella	ENEA Roma
E. Striani	INAF-IASF Roma
S. Vercellone (*Chair*)	INAF-IASF Palermo
V. Vittorini	INAF-IASF Roma & Univ. Tor Vergata

The AGILE AGN Working Group

AGILE γ-ray and X-ray data analysis

M-λ programs coordination

M-λ data analysis

Proposals and science cases

Papers, Conferences, Workshops

Weekly telecons

Inter-play with other WGs

Calibration duties

SW development and testing

ASDC support

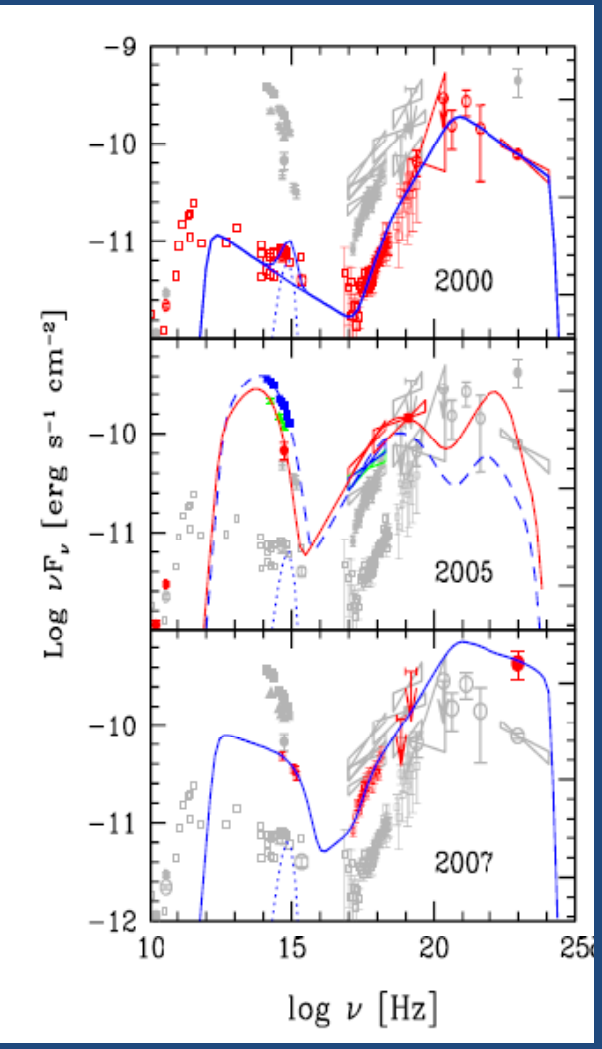
Talk outline

Variability close the “three” peaks in LBL

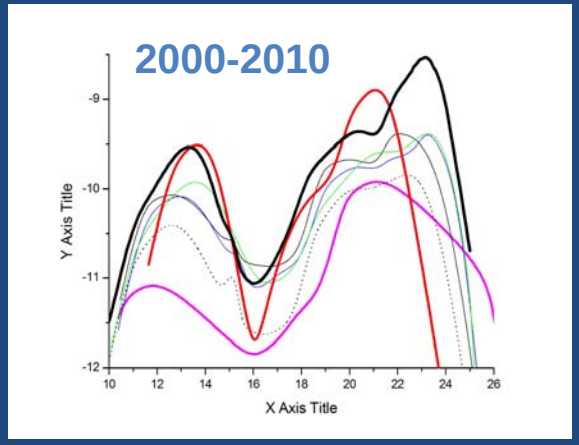
The recent super-flare of 3C 454

Some considerations

3C 454

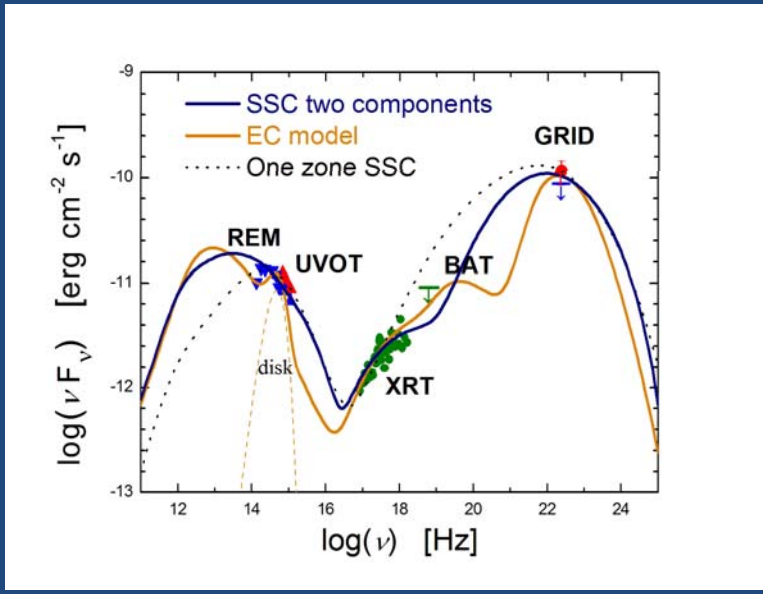


Ghisellini et al. 2007

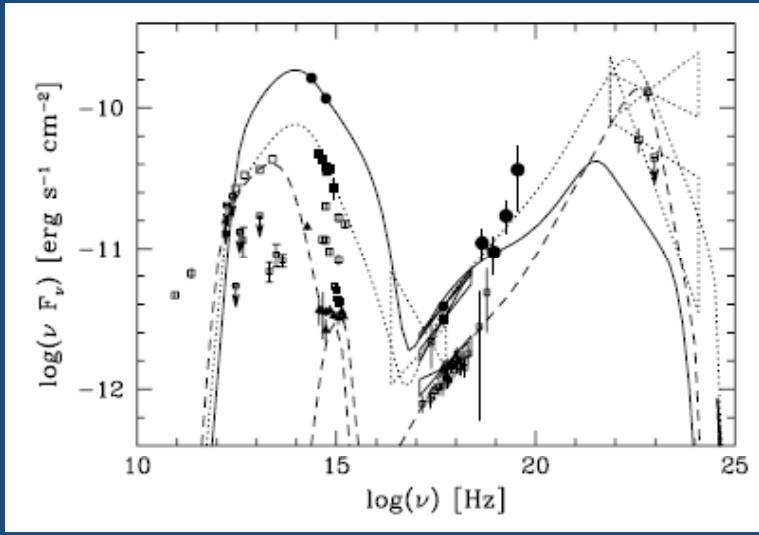


AGILE AGN WG

PKS 0537- 441



Pucella et al. 2010



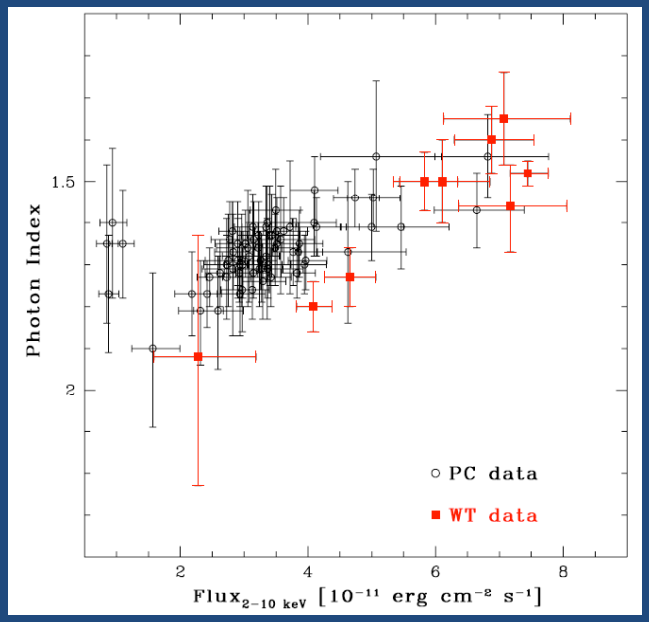
Pian et al. 2007

Slope variation in X-ray appear moderate to respect other bands!

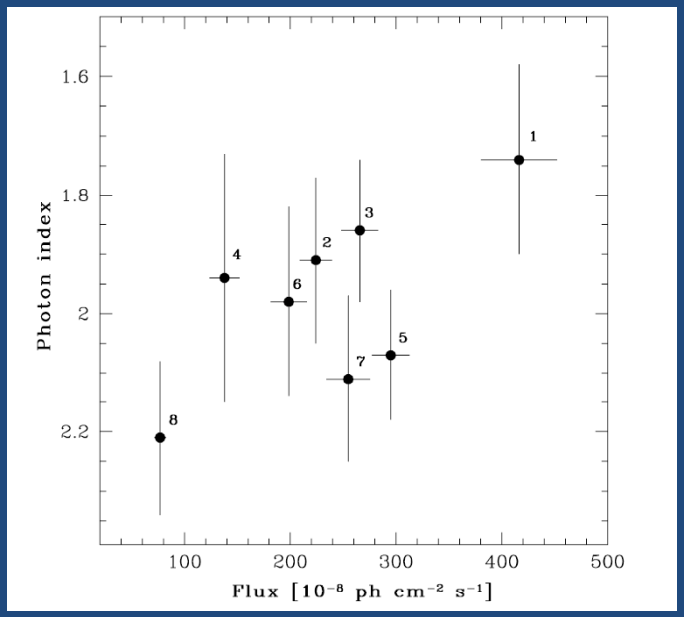
Spectral trend

Long-term X-ray and γ-ray data show a moderate harder-when-brighter spectral trend for 3C 454.

Swift/XRT

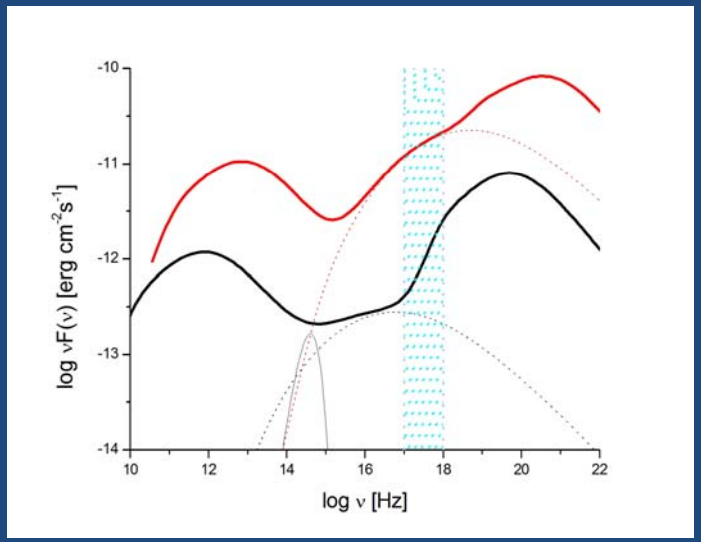


AGILE/GRID



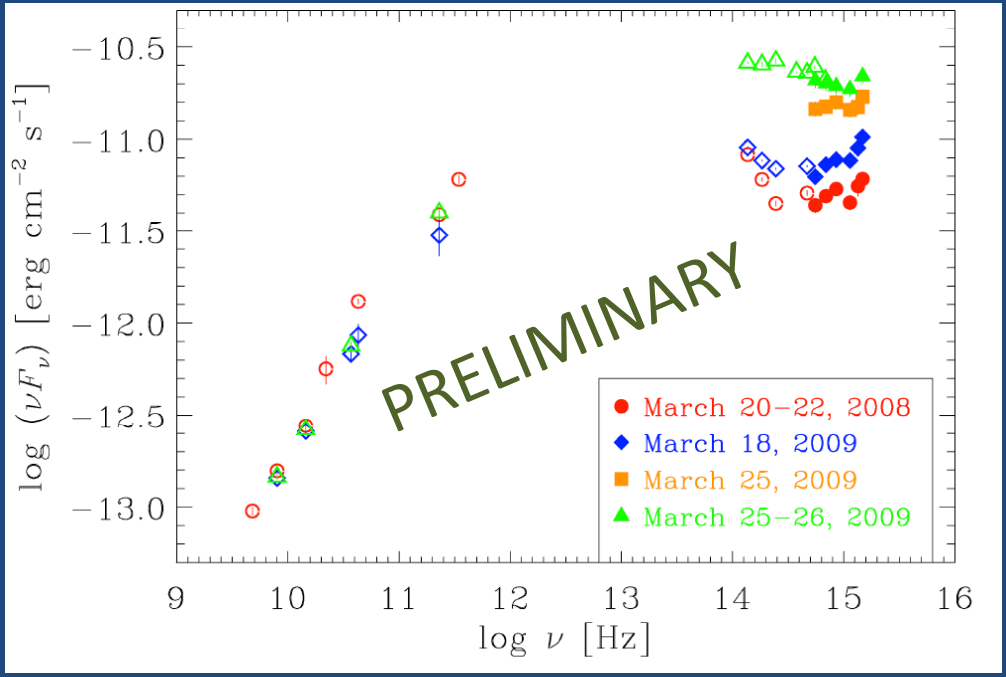
Vercellone et al., 2010, ApJ, 712, 405

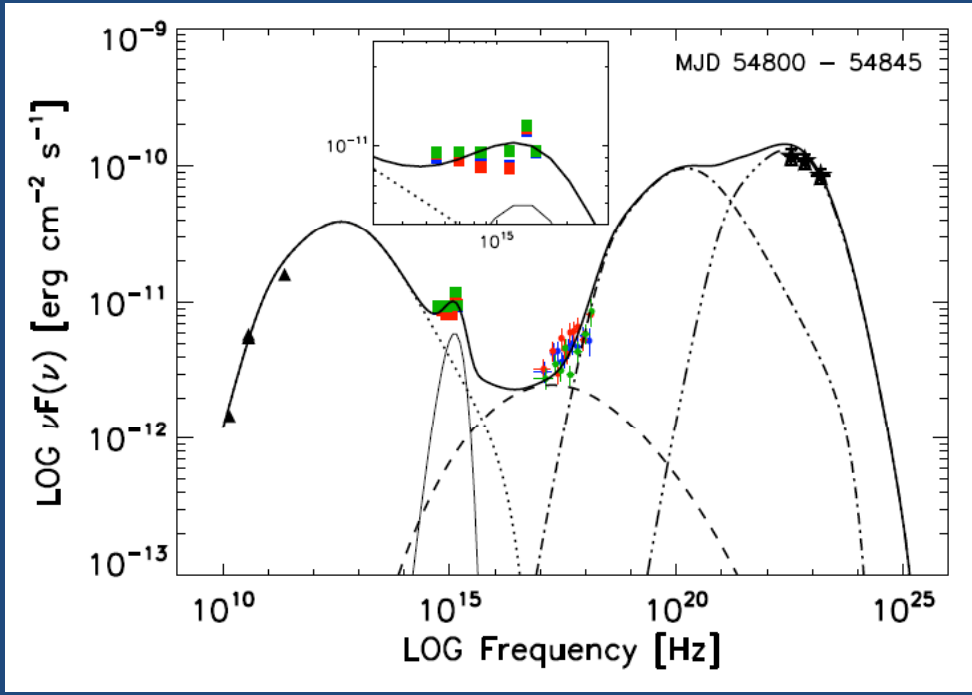
But if only electron injection-acceleration works strong softer-when-brighter trend results!



Peculiar features

Moreover, some variations in the blue bump are involved in FSRQ.





D'Ammando et al., 2010, A&A, in preparation

PKS 1510-089 – March 2009 campaign

Swift/UVOT and GASP-WEBT observations show the presence of thermal signatures in the optical-UV spectrum with variations.

Vercellone et al., 2010, ApJ, 712, 405

3C 454.3 – October 2008 campaign

Low γ-ray state: the thermal disc contribution becomes prominent and shows variations.

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3C 454.3 super-flare

Striani et al., 2010, ApJL, Submitted on Feb. 02, 2010

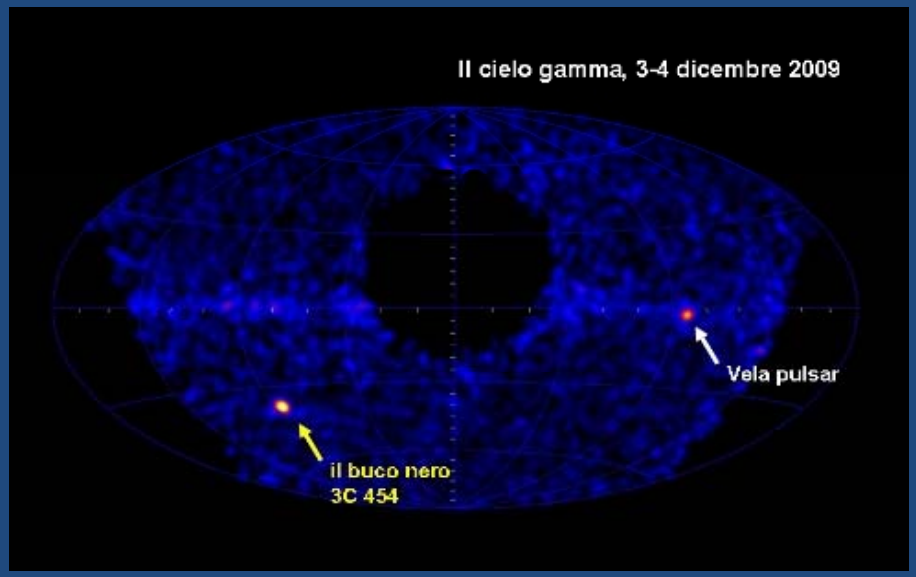
3C 454.3 underwent the most dramatic γ-ray flare, reaching a γ-ray flux of about 2000E-8 ph cm^{-2} s^{-1}, 2.5 times brighter than the Vela Pulsar.

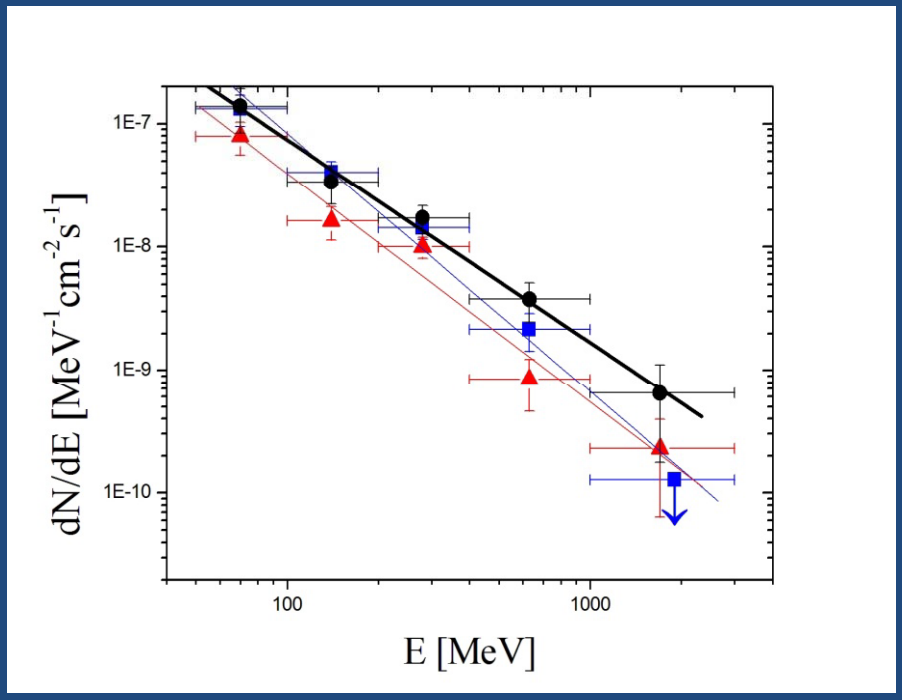
Photon index:

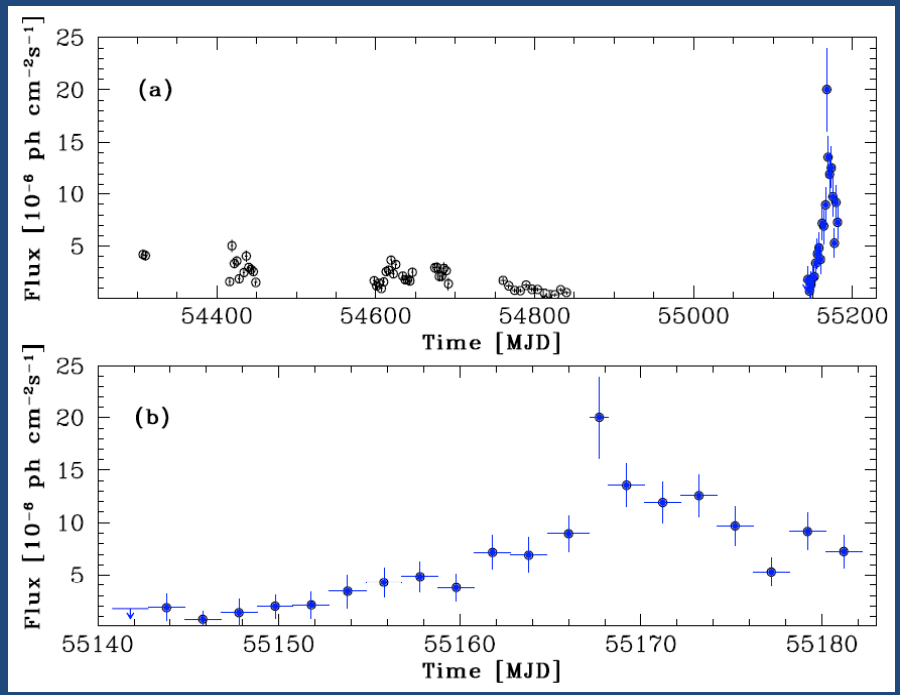
pre-flare = 1.85±0.26

flare = 1.66±0.32

post-flare = 2.04±0.26





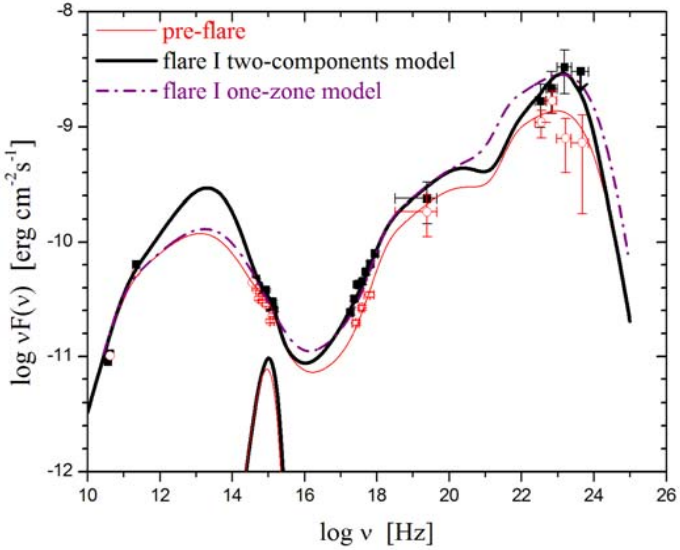


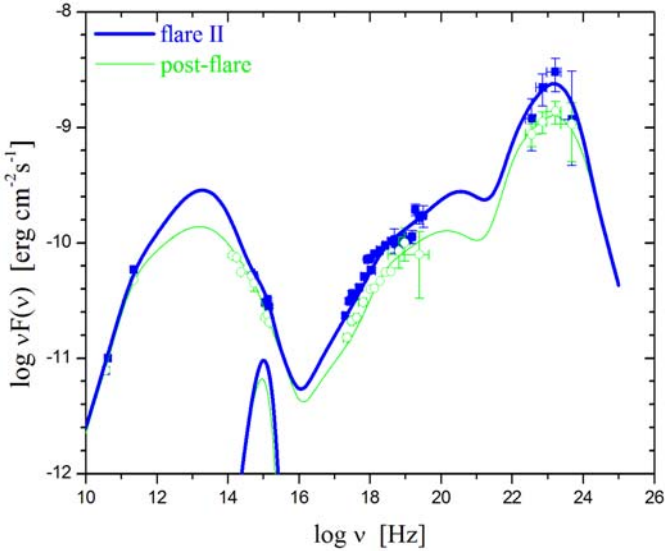
3C 454.3 super-flare

Four Spectral Energy Distributions have been performed to study the pre-flare (5-day integration time centered on MJD 55162.4), flare (1-day centered at MJD 55167.7), 2nd flare (2 days centered at MJD 55172.7), post-flare (5.5 -day centered at MJD 55180) behavior of the source.

Two models have been adopted for the super- and II-flare: one zone SSC+EC, two zones SSC+EC ; the 2nd electron population has been added to account for the hardness of the gamma-ray . It is likely related to additional particle acceleration and/or plasmoid ejection near the jet basis.

Lower B, slightly higher γ_{break} and slightly higher Disk are requested!





Pacciani et al. 2010, (see also Bonnoli et al. 2010)

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This puzzle suggests:

Summary

Optical activity in FSRQ are due to moderate injection-acceleration of electrons into the jet , $\gamma<400$ is involved to avoid the not observed softer when brighter trend.

Some growth of the accretion rate is requested in γ-ray and X-ray activity to reproduce the observed harder when brighter trend.

Some growth of the bulk Lorentz factor Γ with slightly lower B is also compatible with the observed spectral trend in FSRQ flares.