EXTRAGALACTIC TRANSIENTS WITH MAGIC

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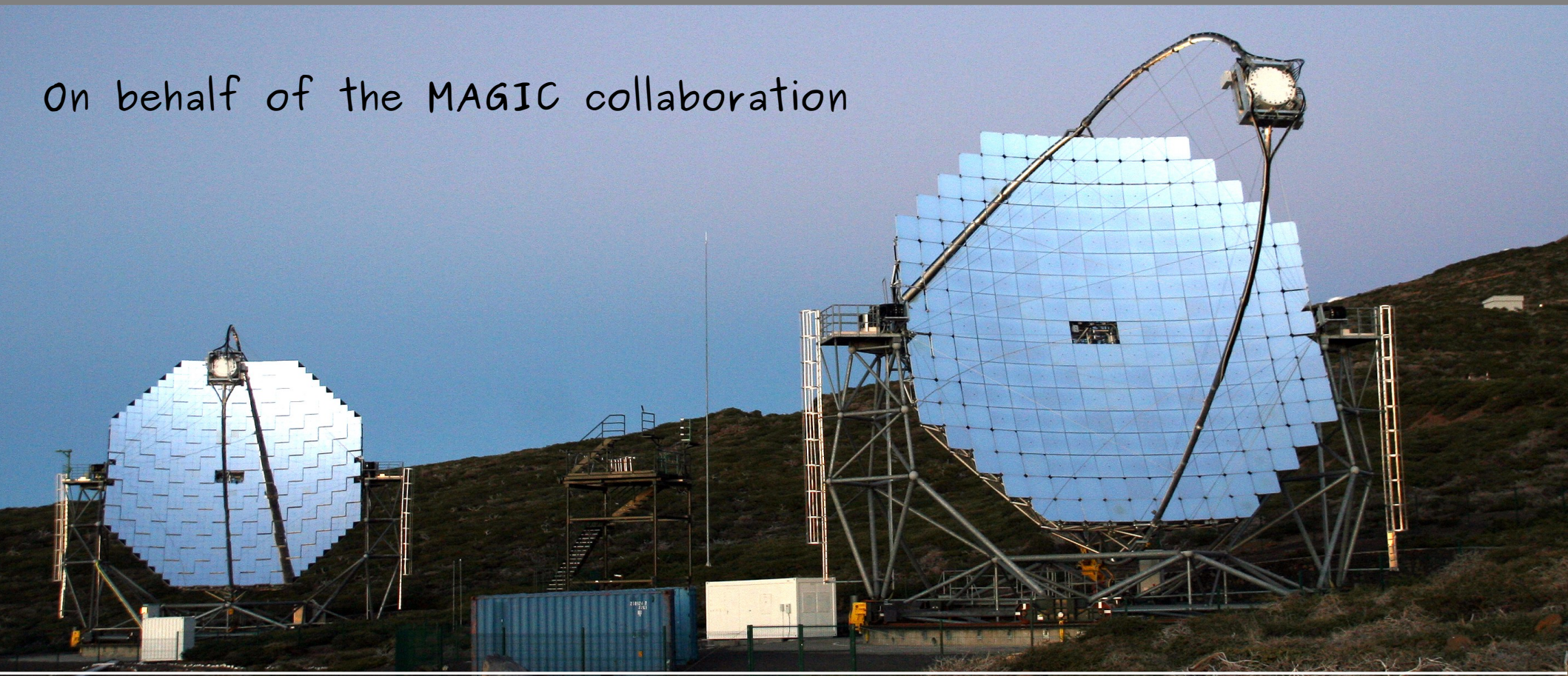
Max-Planck-Institute for Physics

On behalf of the MAGIC collaboration



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Latest AGN results
- the optical connection -

Gamma-Ray Bursts in VHE
- searches with MAGIC -

The TDF Sw 1644
- VHE limits -

Background: Mark Rothko – 'Orange and Yellow' - 1956

THE MAGIC TELESCOPES

Located at La Palma
(Roque de Los Muchachos)

Altitude: 2200 m a.s.l.

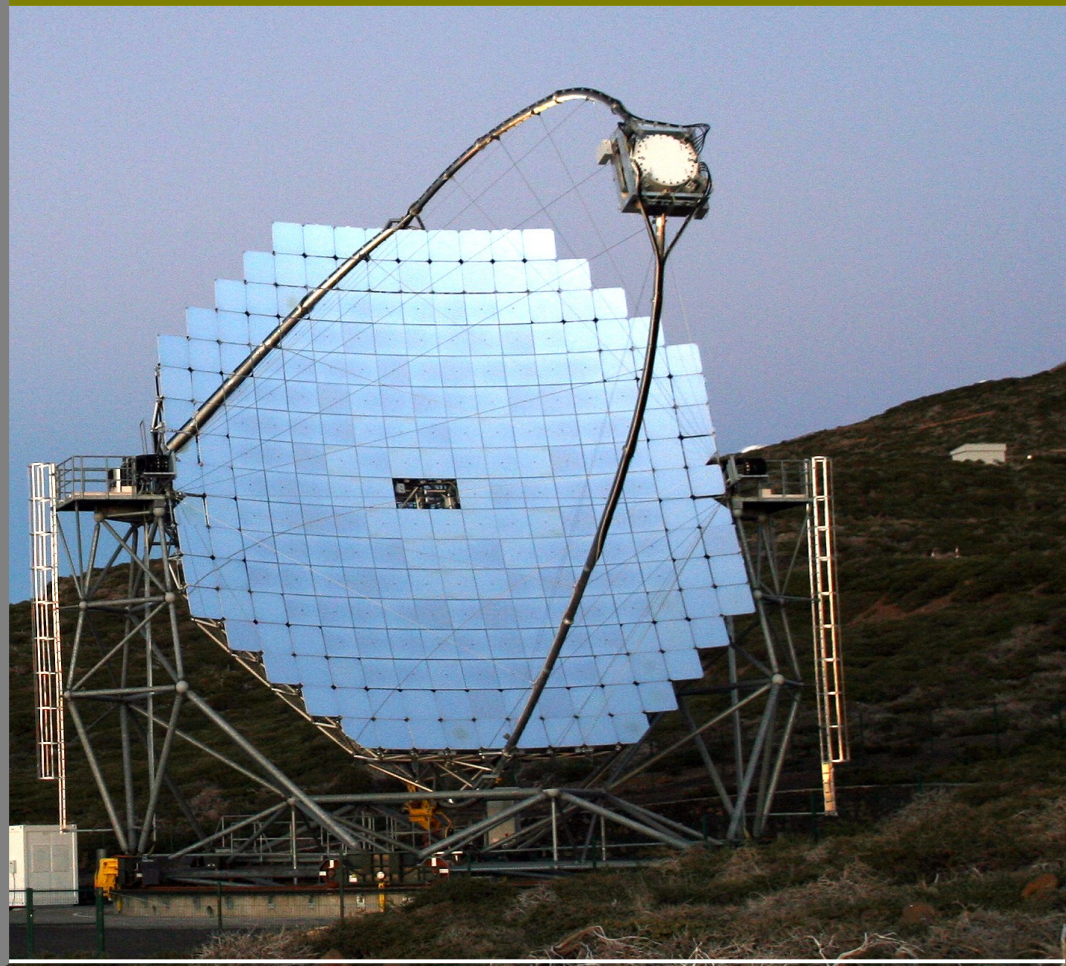
Two 17-m diameter IACTS.
MAGIC-I - since 2004
Stereo system started 2009

Energy Threshold: 50 GeV

Sensitivity: ~ 0.8% Crab
(above 300 GeV, 50 hrs)

F.O.V.: 3.5°

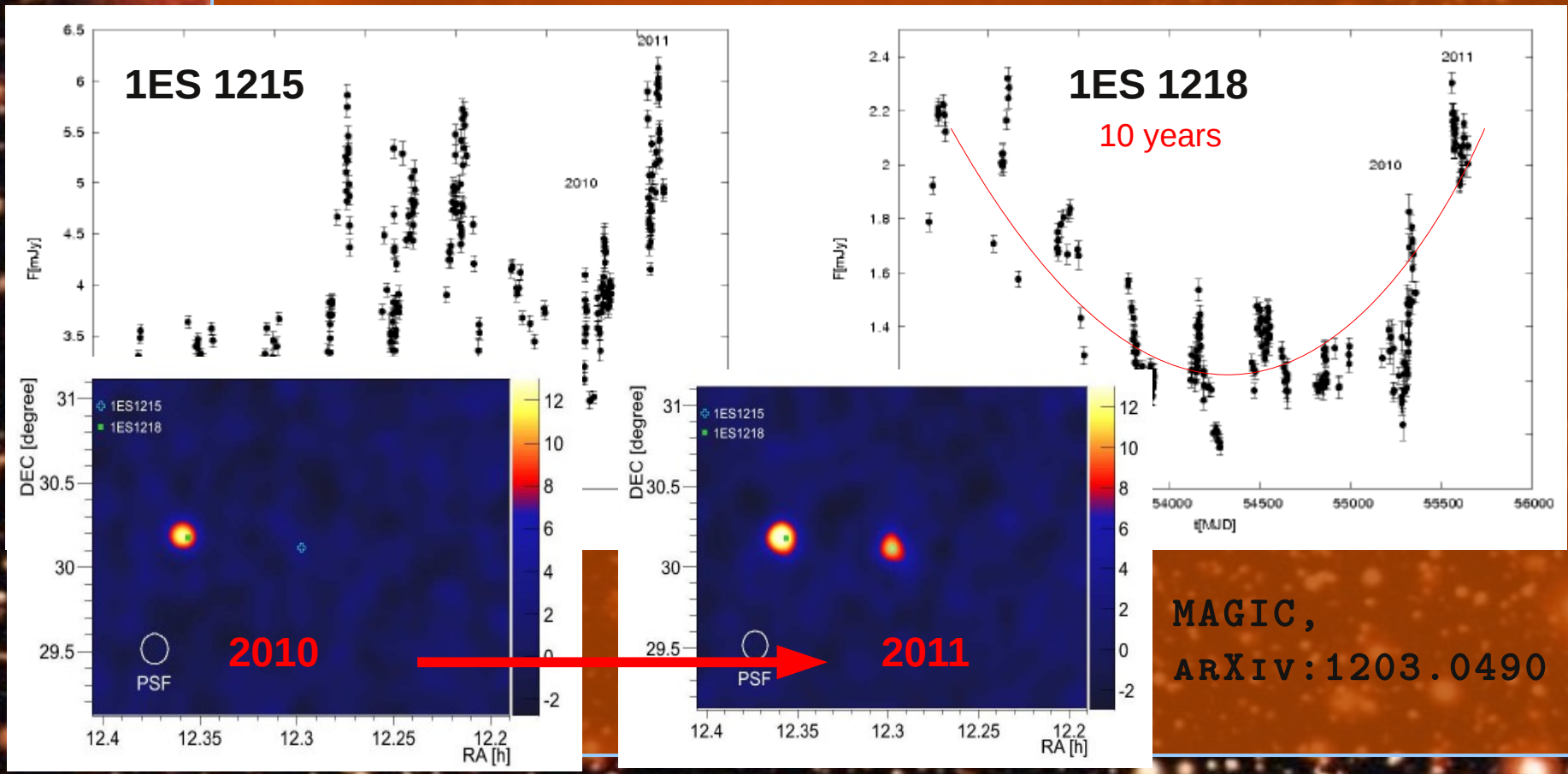
◊ Fast rotation capability



Latest AGN results

- optical connection -

MAGIC has a strong synergy with optical observations (KVA, LT...): Mrk 180, 1ES 1011, S5 0716, ...

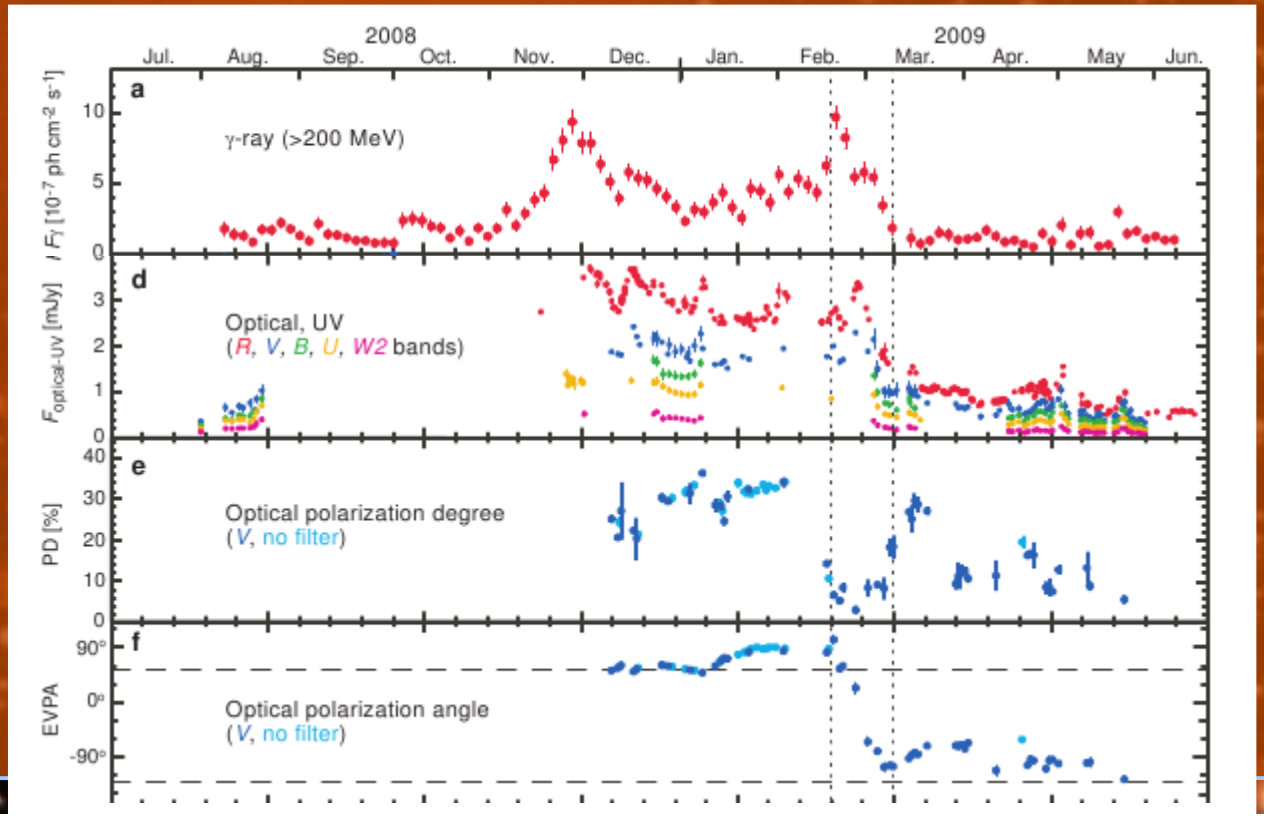


MAGIC, arXiv:1203.0490

Latest AGN results
- polarimetry -

Polarisation is natural from synchrotron emission,
and intense in freshly accelerated radiating particle pops

Extra tool to study the structure and SED of Blazars



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Abdo+ 09

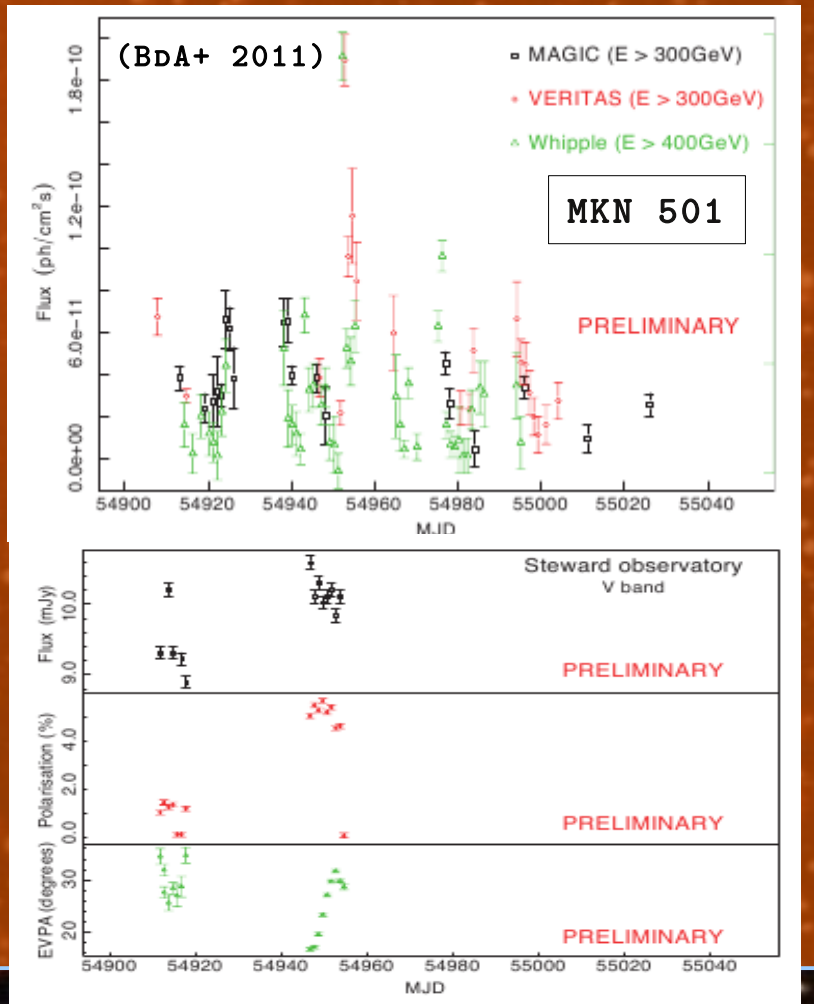
Latest AGN results

- new view to SED -

New view of the SED and spectral correlations for Blazars...

- correlated variability signatures can show up in optical polarisation only

- polarisation data can be used to separate the variable emission component (blob) from the 'Quiescent jet' giving a new possibility for modeling the SED (BdA+ 2010)



Gamma-Ray Bursts in VHE

Fermi-LAT has seen a number of long-bursts afterglows:

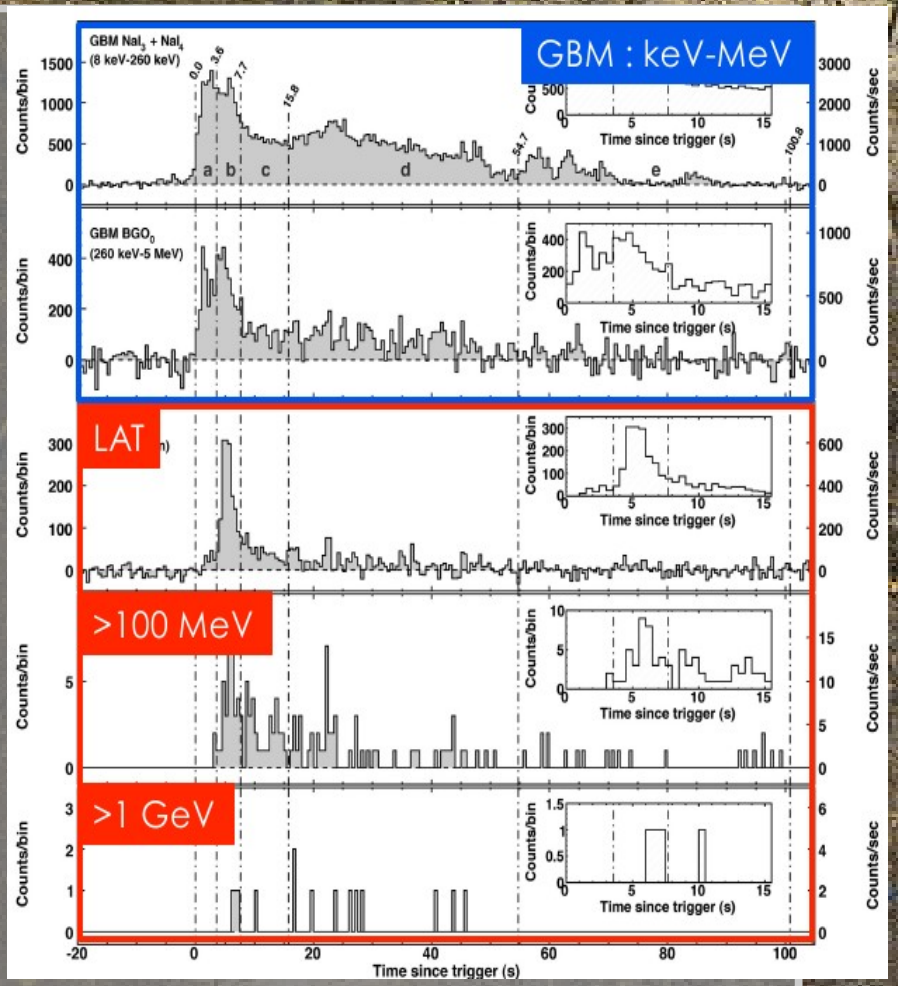
- large isotropic energy bursts;

- hightest photon energy ~ 30 GeV;

- several bursts with max-photon energy above 1 GeV;

- evidence for delayed onset of GeV LAT emission

- evidence for an extra spectral hard component to the band function at late times



GRB 080916C
Plot: Daigne - HEPRO III

Background: Michael Lujan – Vicinity of GRB 090423 – 2009

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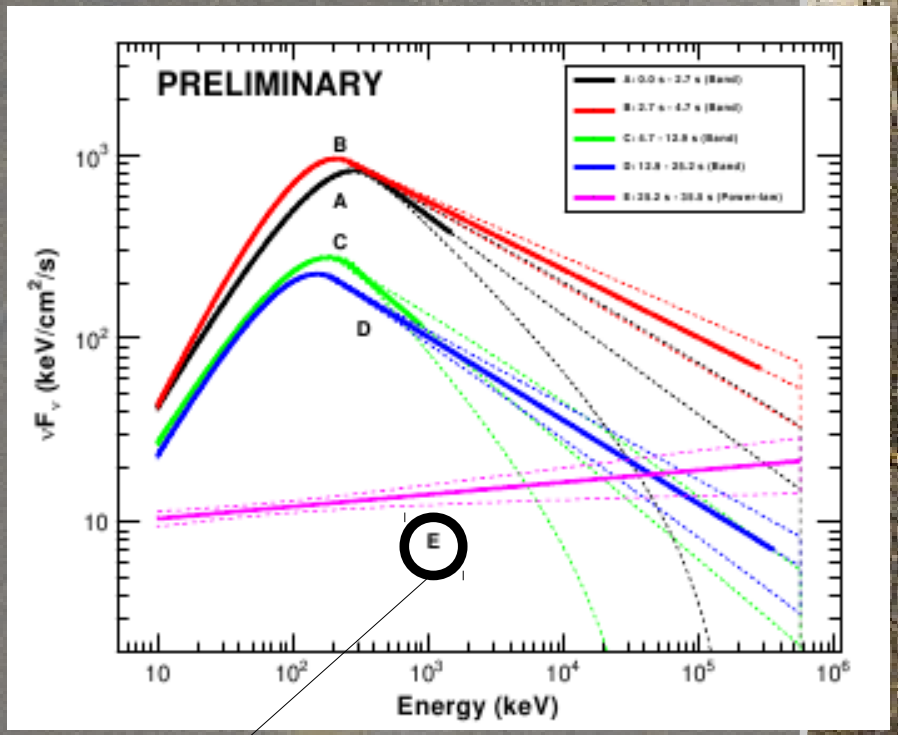


GRB 080825C
T0 + 30s

Background: Michael Lujan – Vicinity of GRB 090423 – 2009

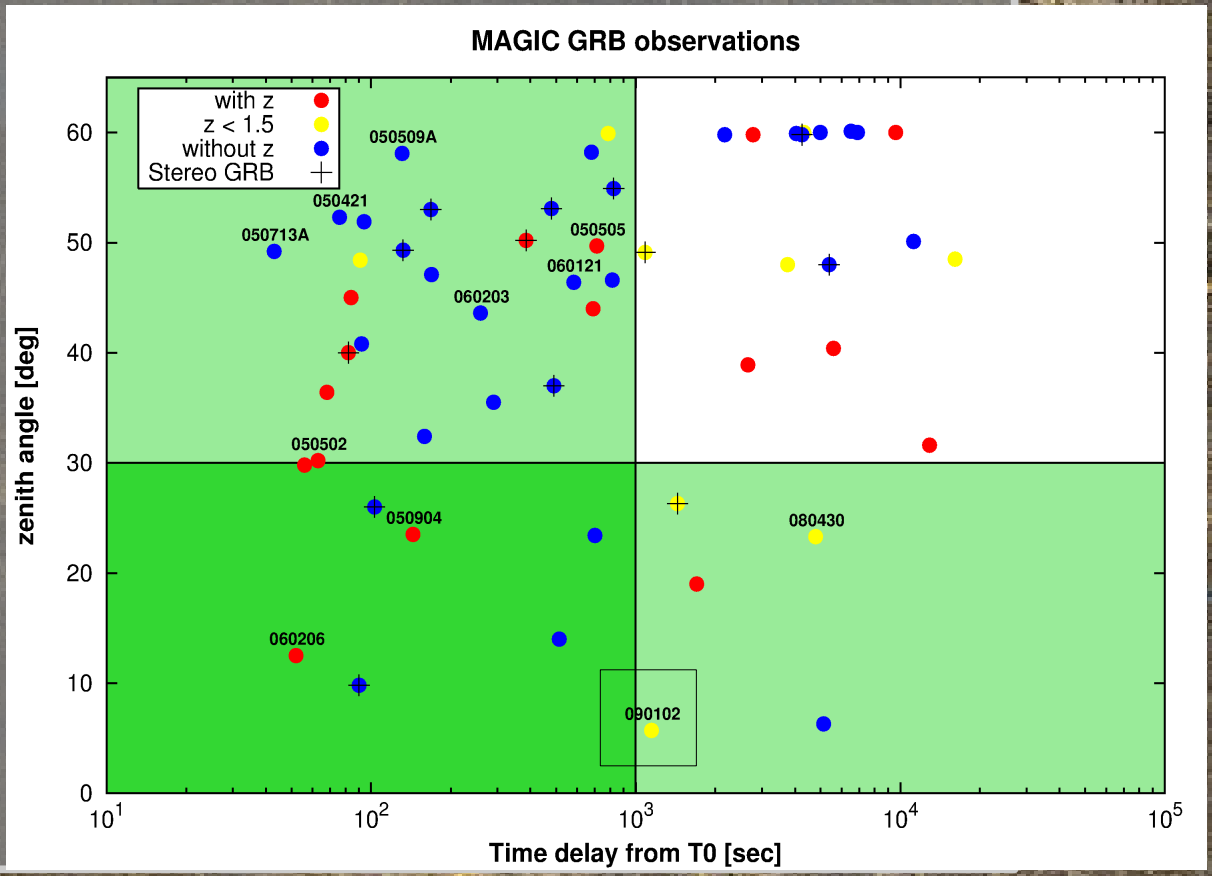
Gamma-Ray Bursts in VHE
- searches with MAGIC -

Over 50 GRBs observed since 2004, (current rate ~1/month) no positive detection.

<u>Important factors</u>:

- low-zenith for low E_thr.
- Early times (1000 sec)
- low redshift (< 1.5)

Search from stacked analysis of mono data shows no hint of Signal (Scapin 2009)



Background: Michael Lujan – Vicinity of GRB 090423 – 2009

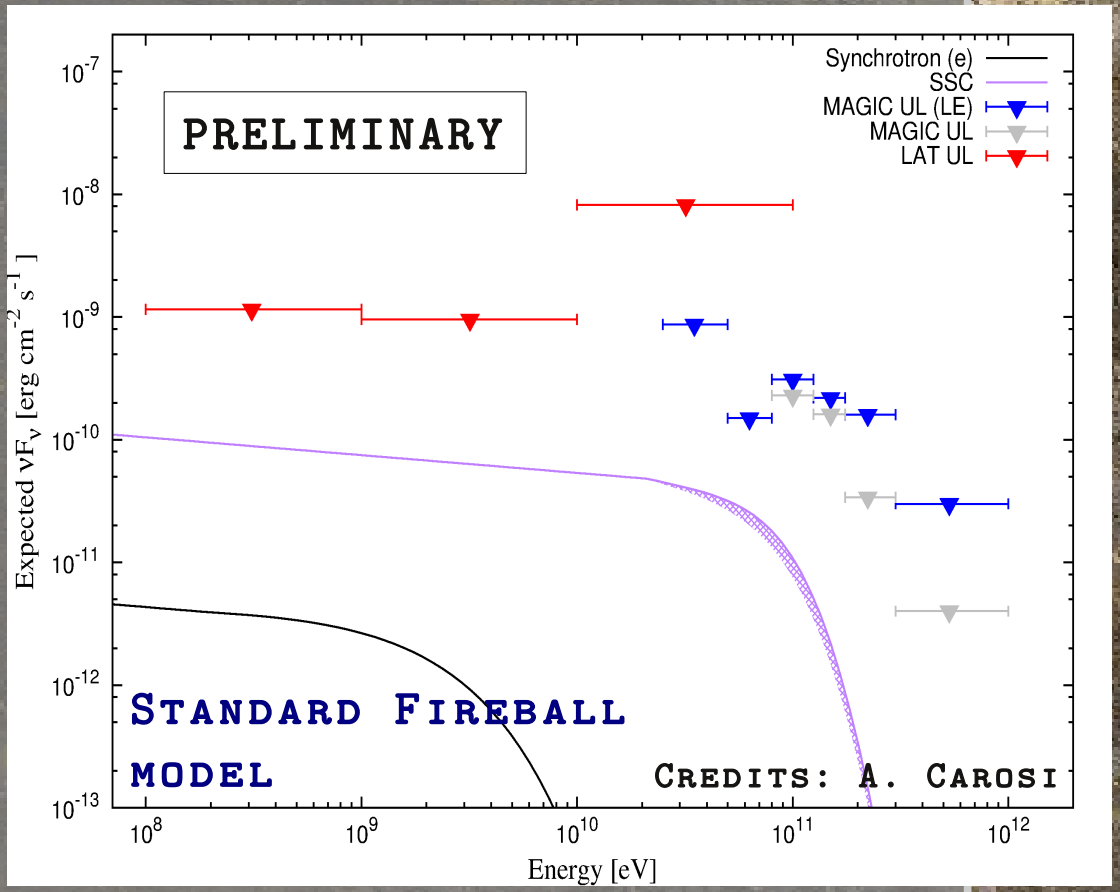
Gamma-Ray Bursts in VHE

- GRB 090102 -

T_{90} = 27 ± 2 s
Delay = 1100 s
z = 1.547

- VHE observations useful to discriminate between hadronic and leptonic models.

For all SEDs EBL model: Dominguez+2011



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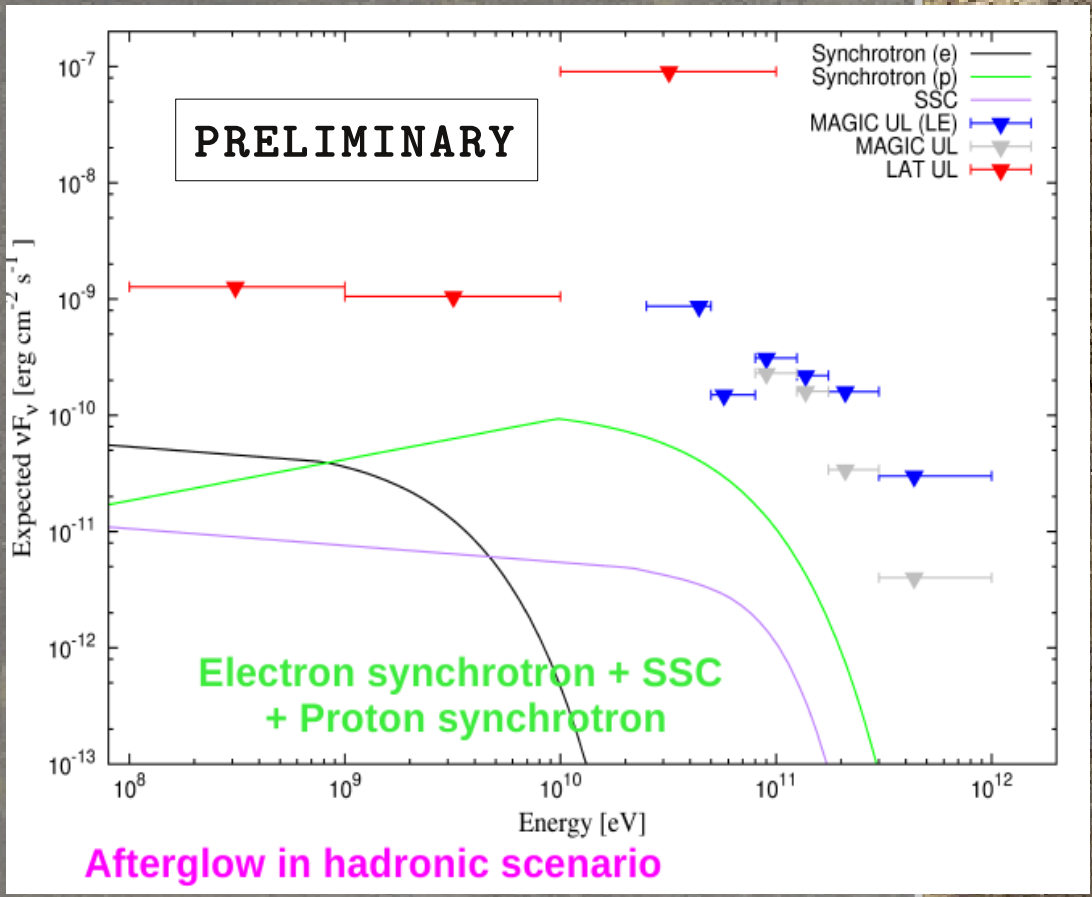

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Gamma-Ray Bursts in VHE

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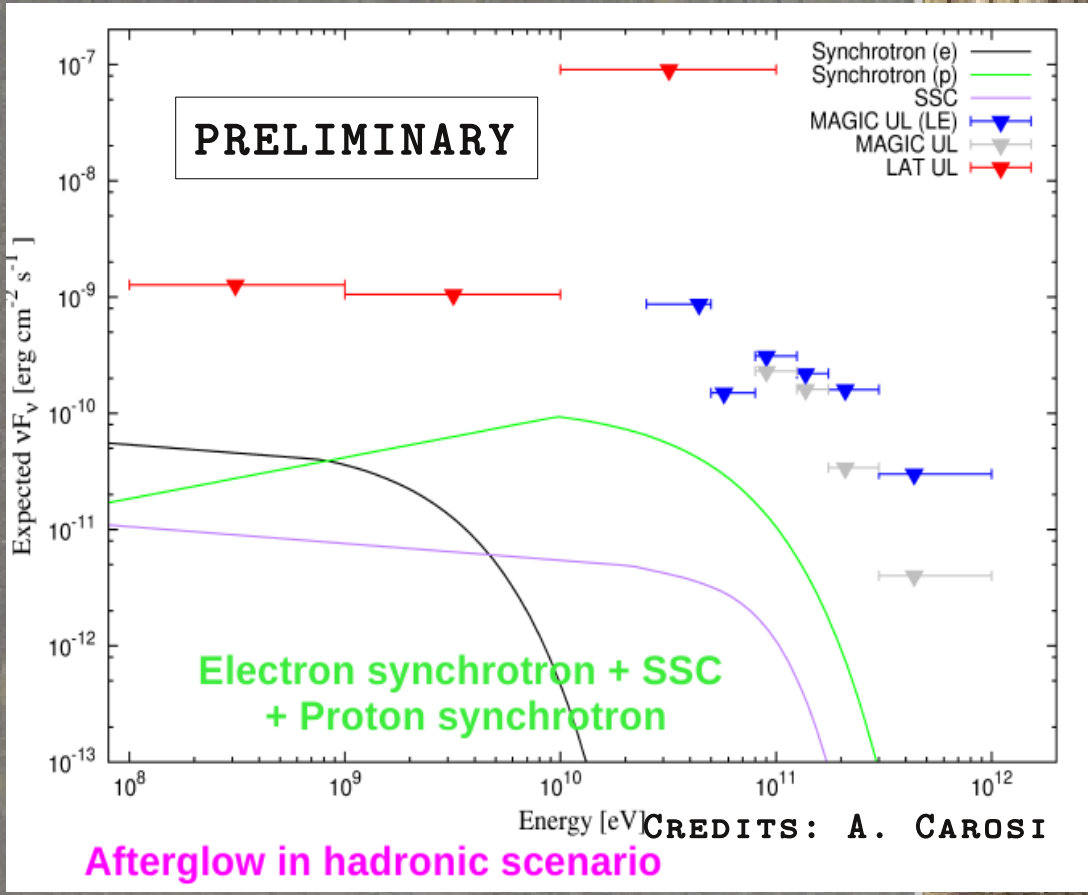


Background: Michael Lujan – Vicinity of GRB 090423 – 2009

Gamma-Ray Bursts in VHE

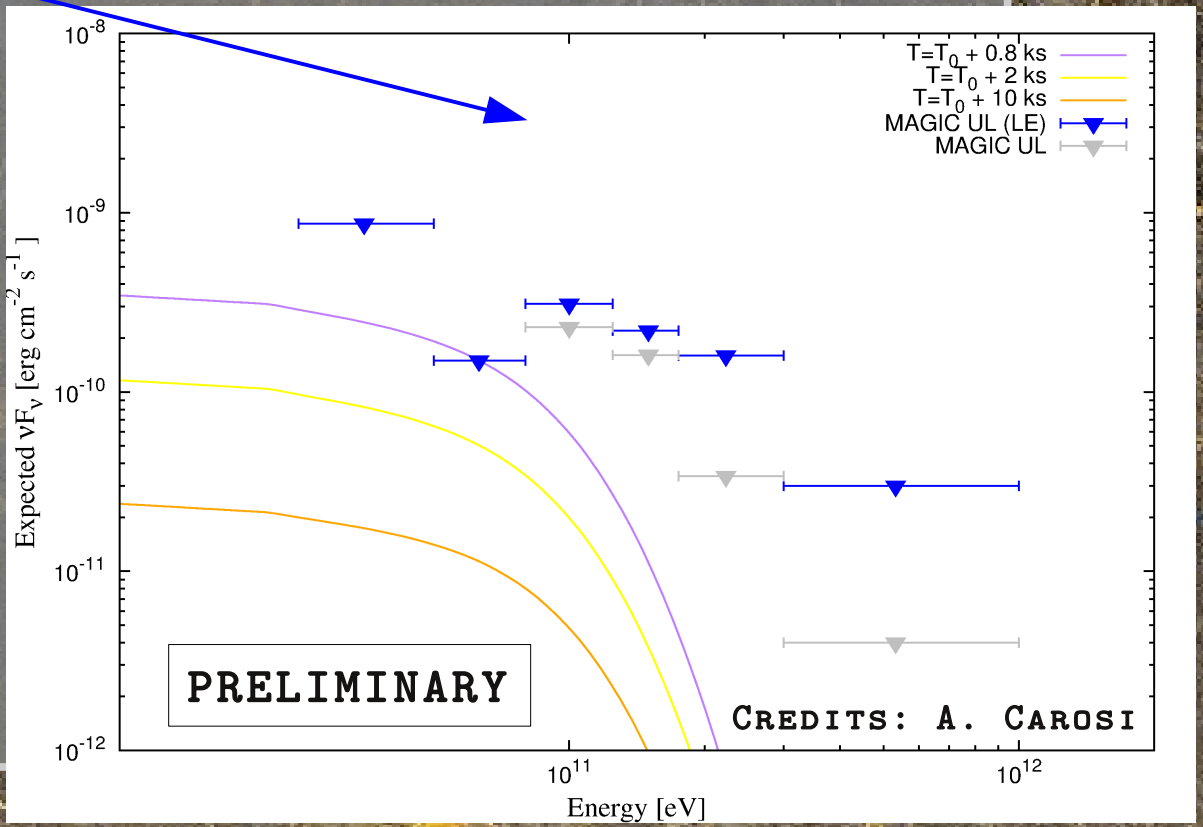
- GRB 090102 -

T0 + 800 s
T0 + 2 ks
T0 + 10 ks

- VHE observations useful to discriminate between hadronic and leptonic models.

- Fast observations: predicted decay of 20% on SSC flux at 40 GeV at dt ~ 1 sec

Prospects for MAGIC Detection of a GRB at VHEs



Background: Michael Lujan – Vicinity of GRB 090423 – 2009

The TDF Sw 1644

Tidal Disruption Flares

- originally predicted by Ress+ in the 80s

- TDFs can ignite activity in dormant central Bhs

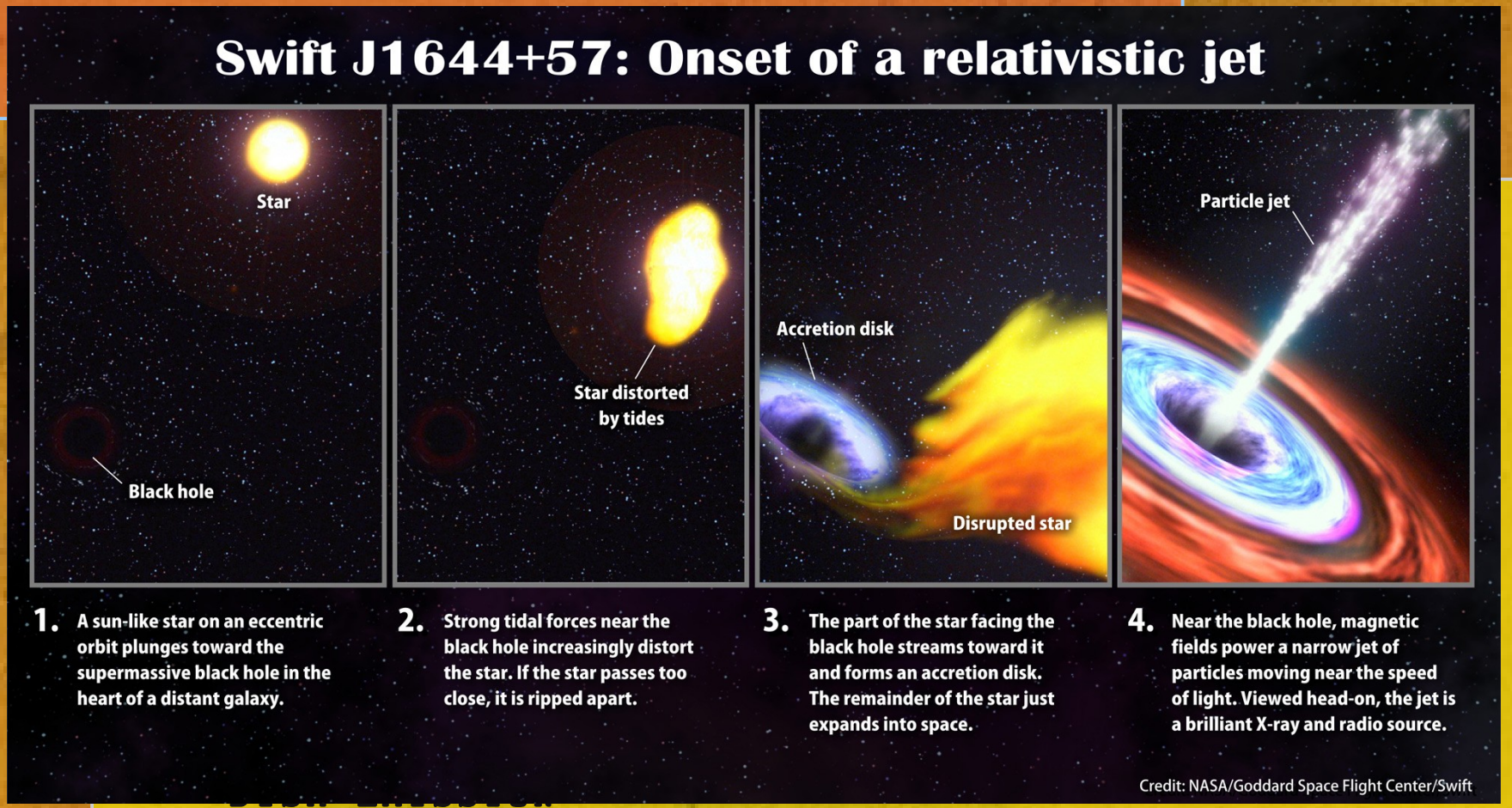
- early observational evidence from optical flares from previously inactive galaxies (Komossa 2002)

- intense signature expected on X-rays from acc. Disk emission

⇒ the event Sw 1644 was the first TDF followed from its early developments, showing signature of accretion onto MBH and of a JET FORMATION

Background: Anish Kapoor [no title] – 2001 – Tate Collection

The TDF Sw 1644



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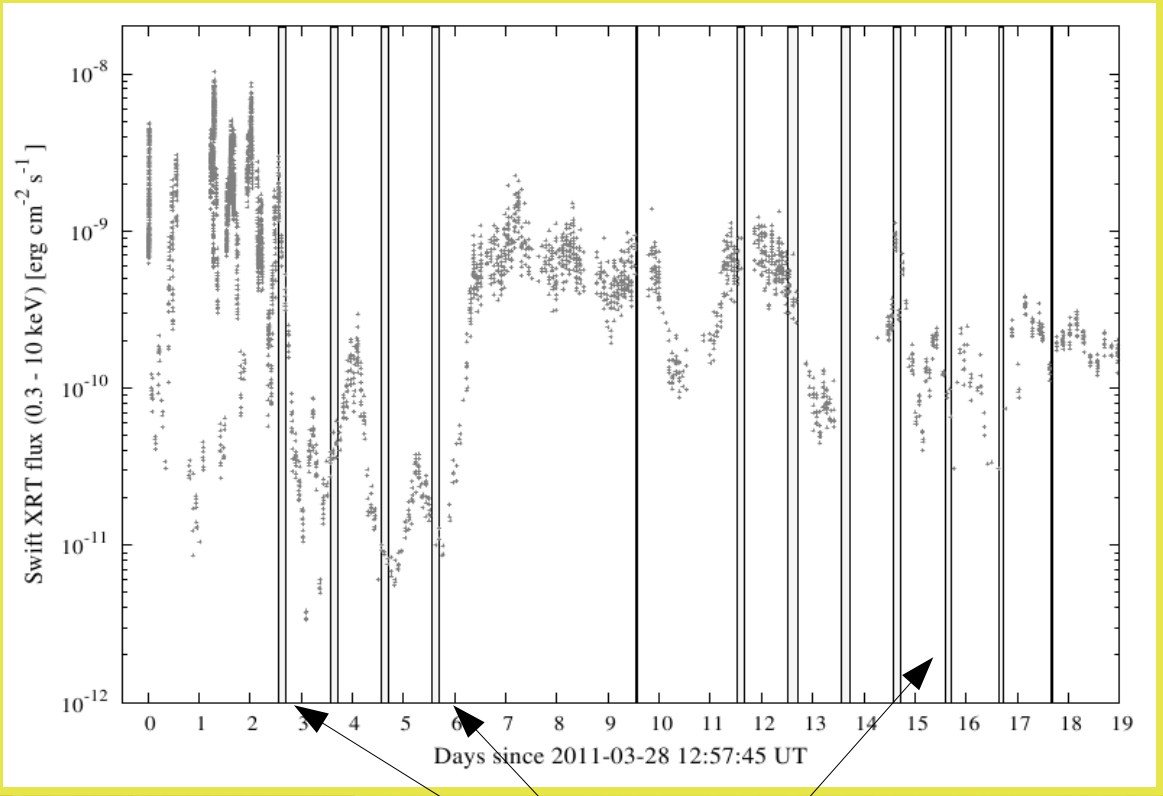
The TDF Sw 1644
- MAGIC Observations -



MAGIC Observation Windows

- MAGIC observed source for 27 hours from 31 March to 15 April 2011

- Energy threshold 100 GeV

- Analysis with sum-cleaning (Lombardi et al. 2011) gives Higher suppression of NSB and lower E_thr

- Random Forest algorithm for γ/hadron separation

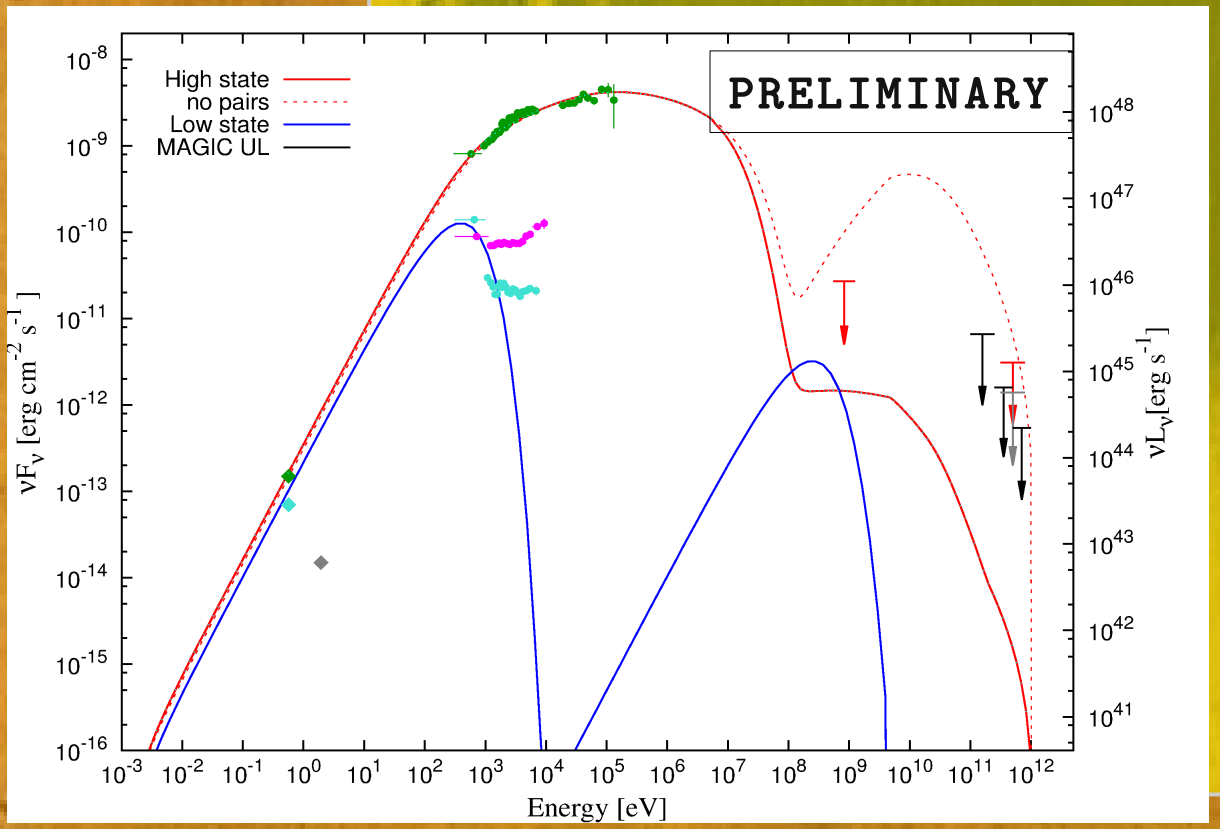
Background: Anish Kapoor [no title] – 2001 – Tate Collection

The TDF Sw 1644

- VHE Limits -

MAGIC Upper Limits

- Upper Limits constrain the 100 GeV range by a factor x2 with respect to Fermi-LAT



- MAGIC data supports model for jet-emission with an IC component suppressed by pp.

- confirms constraint to $\Gamma < 20$ from Burrows+ 2011

- TDFs can make a new and unexpected science case for CTA

Background: Anish Kapoor [no title] – 2001 – Tate Collection

The END

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