Suggestions for new Key Programs

Now: 300 hours for Kps, Cycle 9 max 400 hours, i.e. 1-2 new KPs

Timeline:

-the preliminary proposals shall be submitted two weeks before Physics Meeting in Munich (8-9th April) (free format, 3 pages)

-the final proposals two weeks before Turku Meeting

In the Physics General Meeting we have to present:

-Current status of Physics Topics and Achievements in the Extragalactic Group
-The status of observations and achievements by other IACT groups

The newly proposed and running KOPs will be discussed.

Current KP EBL:

-Trying to catch super flares: monitoring (3C279, PKS1222+216, 1ES0229+200), ToO:s (any source)

-TAC asked to follow the strategy of FSRQ monitoring for 3C279 and PKS1222. And up to now both sources have been very quiet (but the best observing season is only starting now!)

-No observable superflares up to now (except maybe IC310 during collaboration meeting).

-So up to now we have 1ES0229+200 data

Re-evaluation of the EBL KP

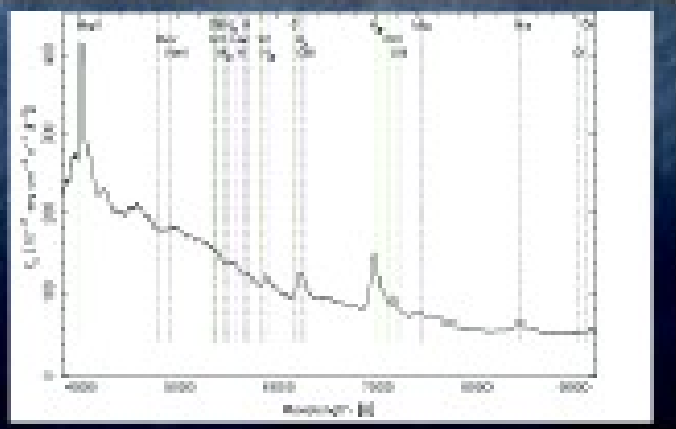
- As the superflares cannot be predicted we might end up not using 125 hours
- Actually if nothing will flare we will only use 25 hours of the 125 hours.
- Obviously we might also end up using whole 125 hours and still not detect EBL
- However, the idea of the KP was to be multi-year program so with accumulating data we should eventually detect EBL signature
- Obviously we should also re-discuss the observational strategy

New KPs

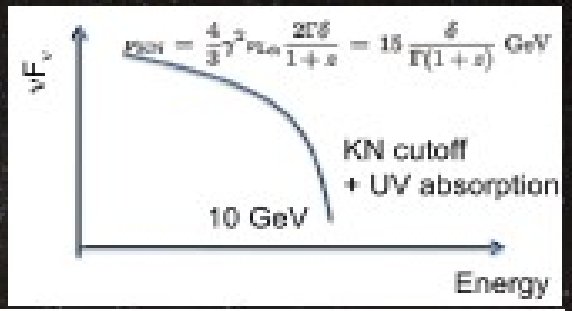
- We suggest: FSRQs or IGMF (see next presentation), but also further ideas welcomed!

Flat Spectrum Radio Quasars

- MWL characteristics:
- VLBA: relativistic jets with knots traveling in the jet.
- Optical: broad emission lines in the spectra
- All wavelengths: variable in all timescales (weeks down to hours)

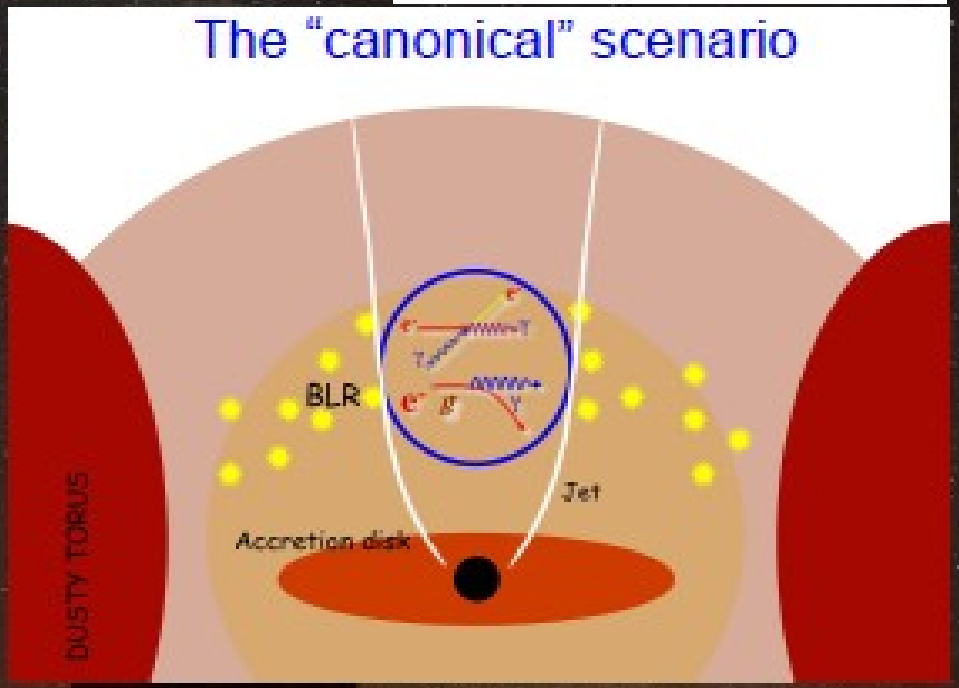


The "Blazar Zone" in FSRQ

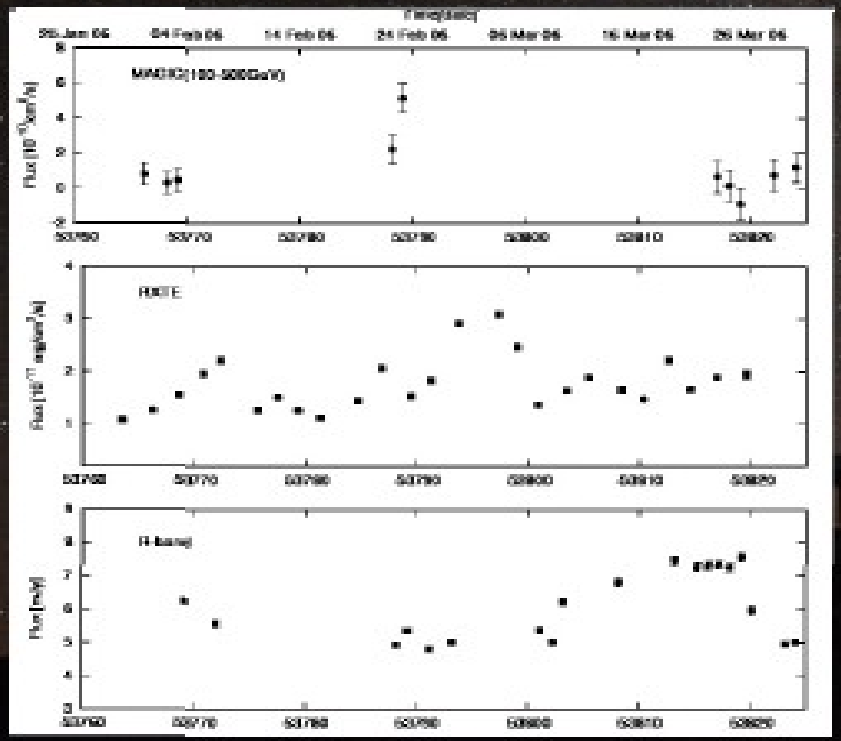


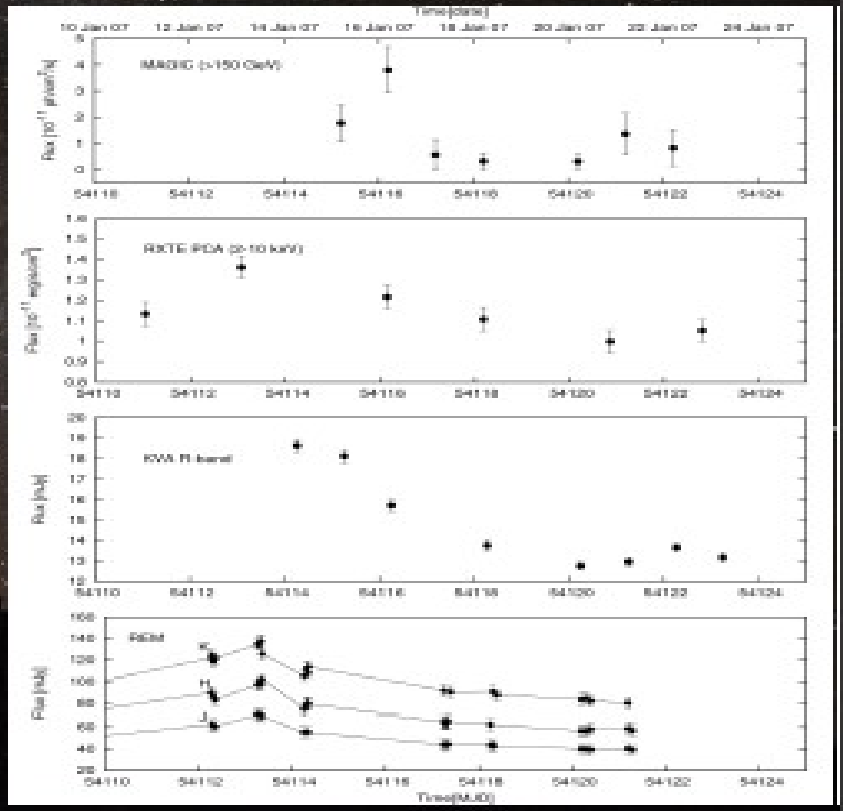
Emission zone <0.1pc in conical jet within BLR

- Short time variability
- ☹ Internal absorption
  e.g. Liu et al. 2008, Reimer 2007, Tavecchio&Mazin 2009
- ☹ Reduced scattering efficiency Klein-Nishina (KN) *e.g. Albert et al. 2008, Tavecchio&Ghisellini 2008*



3C279 MWL Behavior during MAGIC Observations





2006

2007

3C279 MAGIC Observations 2007

- Larionov et al. 2008; WEBT, VLBA and RXTE monitoring of 3C279 simultaneous to MAGIC observtions
- The VLBA data shows an component emerging from the core at MJD 54063+-40 days
- The optical polarization data shows rotation of the polarization (~300 degrees) angle starting around MJD 54115 (duration of two months)
- => Optical flare takes place beyond the VLBA core

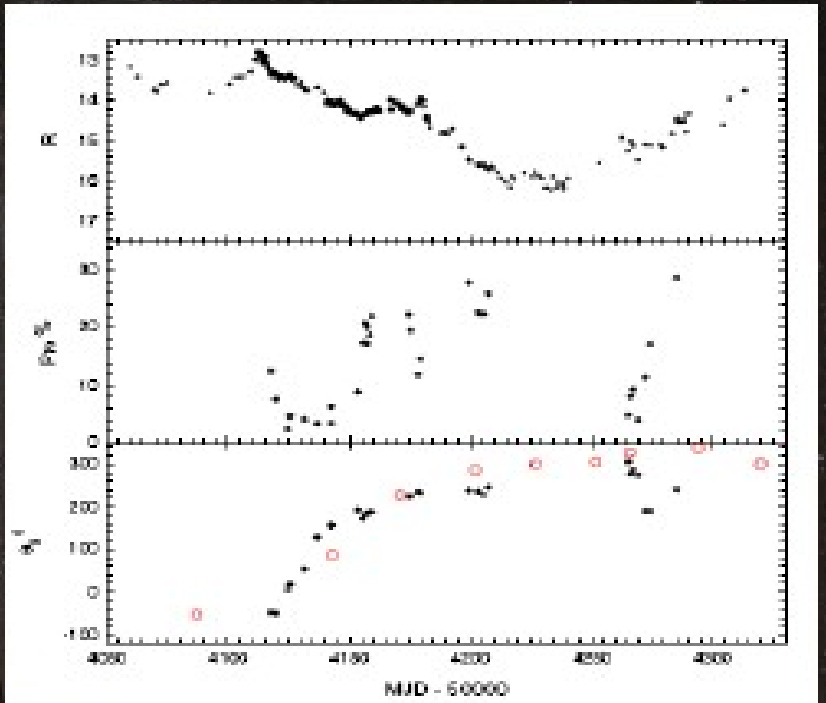
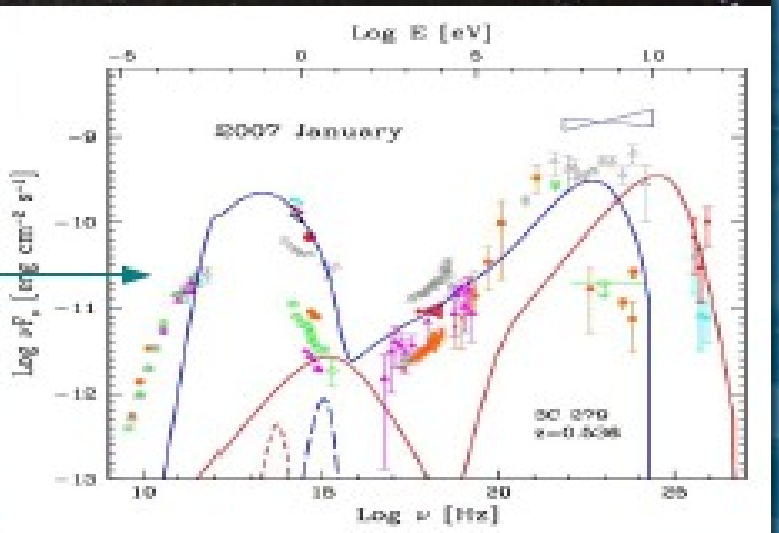


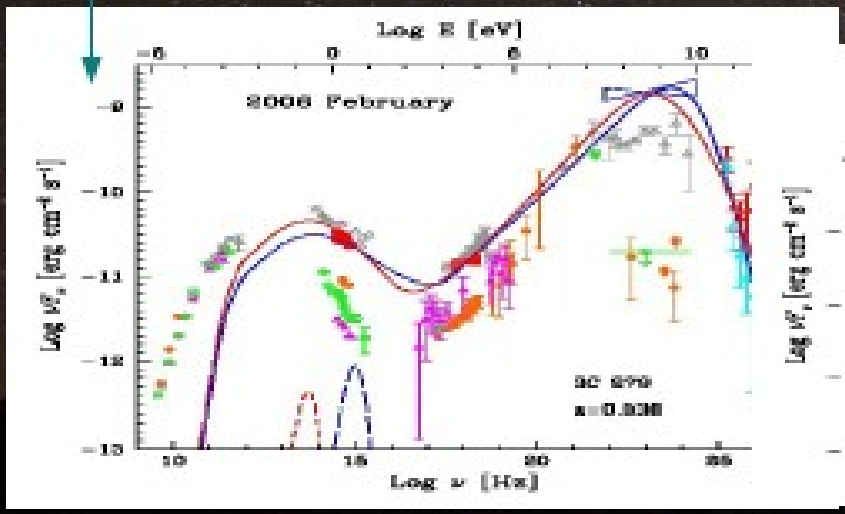
Fig. 9. Optical polarimetric data for 3C 279 obtained during the 2007 campaign. EVPA data for the 43 GHz core are marked with red (open) symbols in the *bottom panel*. The $\pm 180^{\circ}n$ ambiguity in the EVPAs is resolved by requiring the change across contiguous epochs to be $< 90^{\circ}$. No Faraday rotation correction has been applied to the 43 GHz data; see the text.

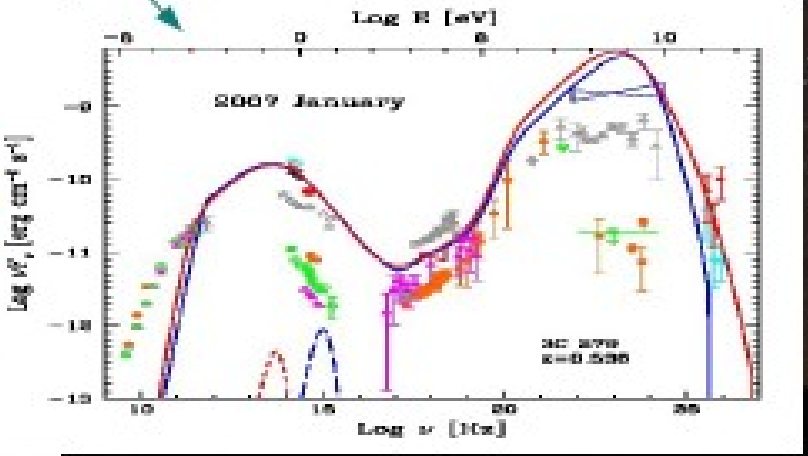
3C279 MAGIC Observations

2006:SED can be modeled with one zone SSC+EC inside the BLR

2007: one zone SSC+EC inside the BLR cannot fit the SED, two zone model with more free parameters can do the job



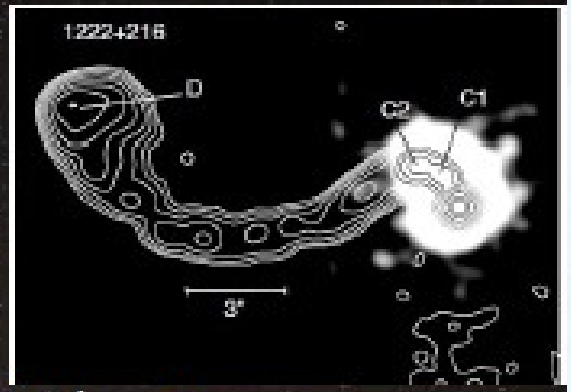




Modeling by F.Tavecchio

PKS1222+21

z=0.432 Lum. dist. 2.3 Gpc



Distorted quasar (bended jet) *Saikia 1993*

Gamma-ray blazar (3EG J1224+2118, 1FGL J1224.7+2121)

Jet aligned to our line of sight ~5-10o

Superluminal motion 17-21c *Homan 2001, Lister 2009*

X-ray emission *Jorstad&Marscher 2006*

The source was very active in gamma-rays (as observed by Fermi) in 2010

$M_{BH} \sim 1.5 \times 10^8 M_{sun}$

$L_{BLR} \sim 10^{45}$ erg/s

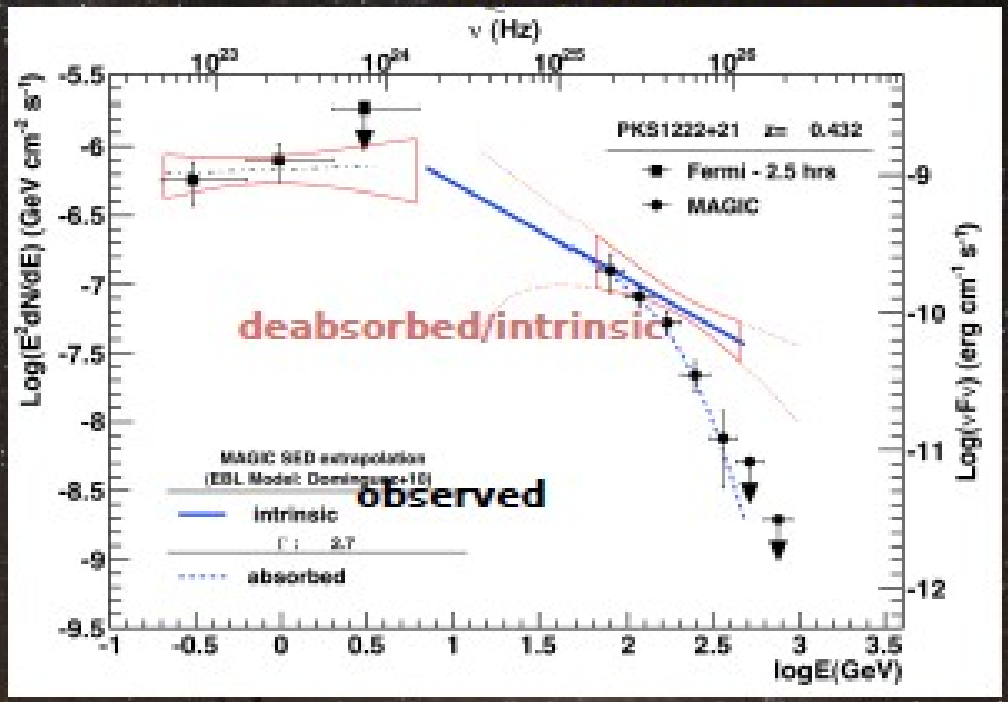
$L_{disk} \sim 10^{46}$ erg/s

$R_{BLR} \sim 10^{17}$ cm

High energy SED

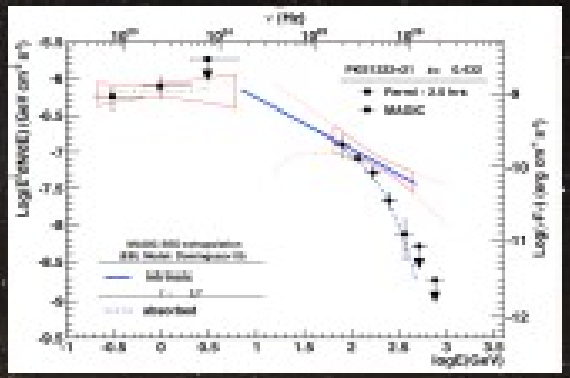
Simultaneous *Fermi*/LAT
2.5 hrs encompassing MAGIC obs.

Aleksić et al. ApJL 730 (2011)



Single component from 2 to 400 GeV
Cutoff excluded at E < ~130 GeV

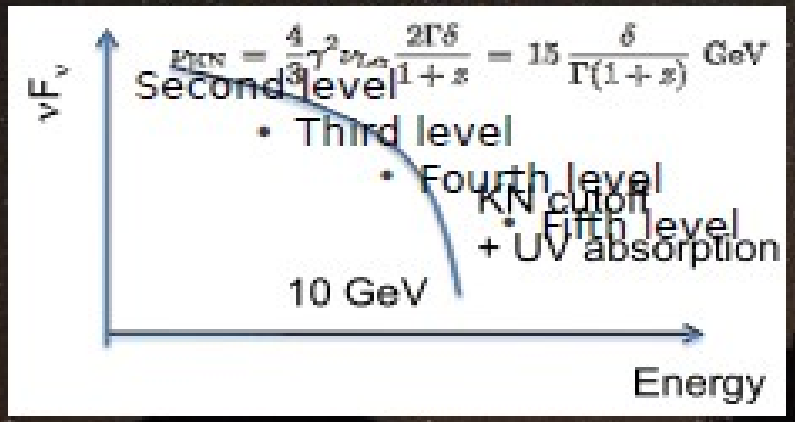
High energy SED



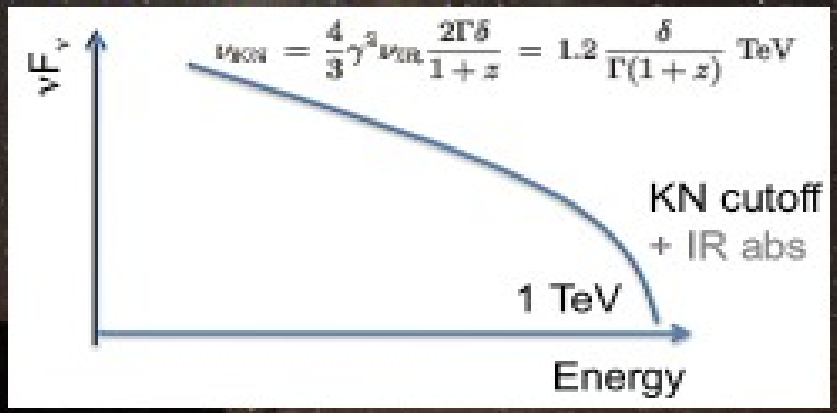
- Internal absorption
- Klein-Nishina break

Ghisellini&Tavecchio 2009

Inside BLR

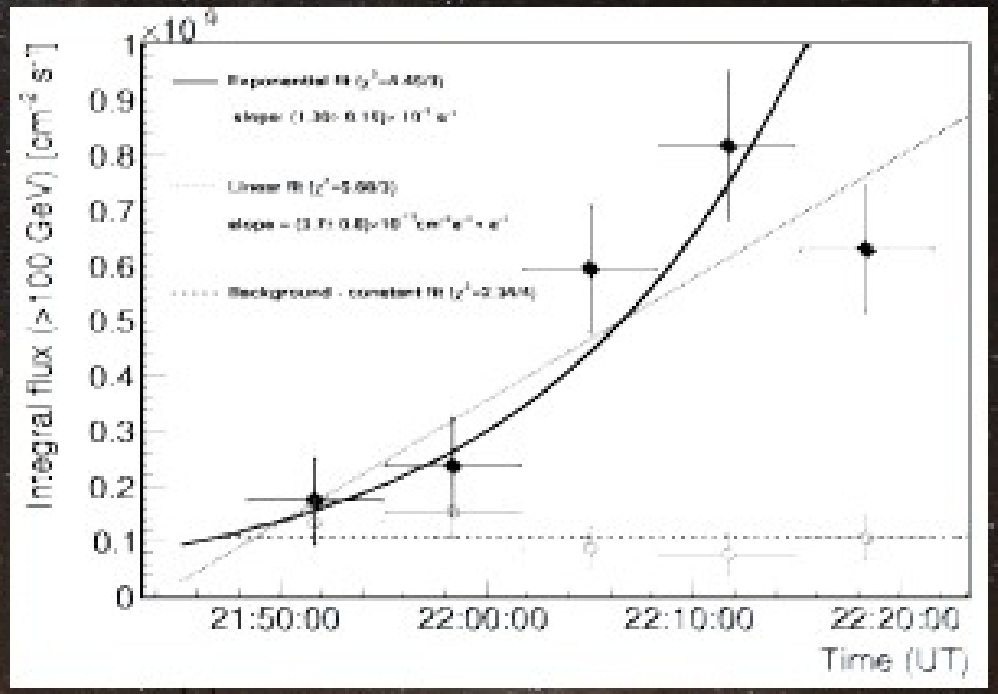


Outside BLR



Light curve

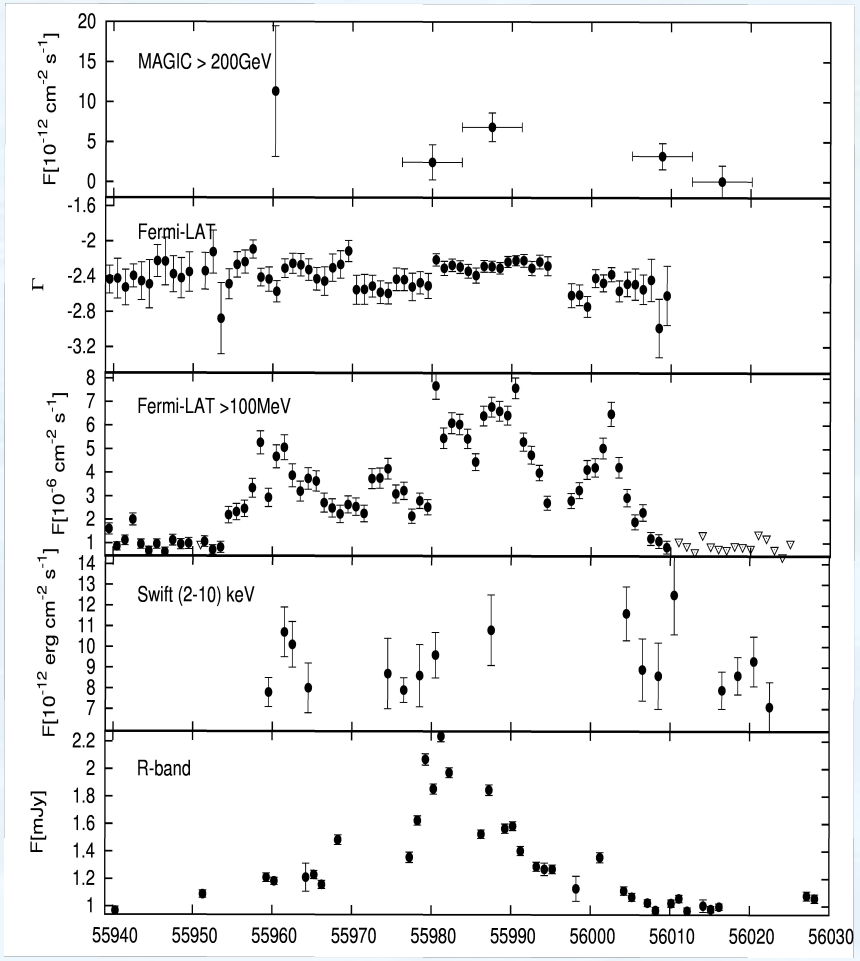
- Very fast variability
  Doubling flux scale:
  ~ 10 minutes
  Size emission region:
  R ~ 10^{14} cm



Aleksić et al. ApJL 730 (2011)

PKS 1510-089

- Detection by HESS in 2009
- MAGIC results from 2012 presented yesterday
- No variability
- Can we detect it also in the low state?



- Why FSRQs:
  1) They should not emit VHE gamma-rays (internal absorption, decreasing scattering effiency)
  2) The three FSRQs we have detected, behave very differently: 10mins variability, daily scale variability, constant flux
  3) Ideal for MAGIC; low energy sources with soft spectra

Observation strategy?

- Shall we concentrate on known ones? Or try to catch new ones?
- Shall we try deep observation of PKS1510-089 to see if we can detect it also during quiescent state?
- Shall we continue flare hunting? (Clear overlap with current KP in any case unless we change strategy for the current one)
- i.e. What do we benefit by moving from ToO Monitoring and Mother of ToO to KP?