

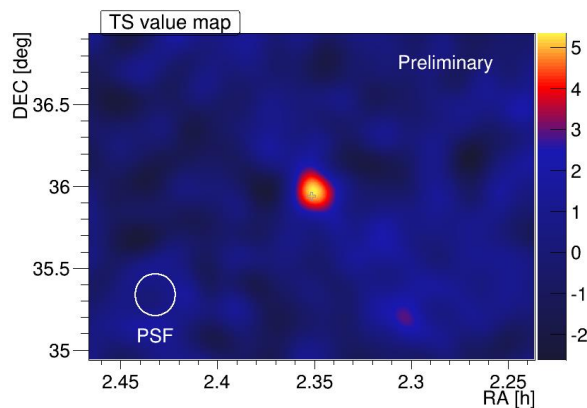
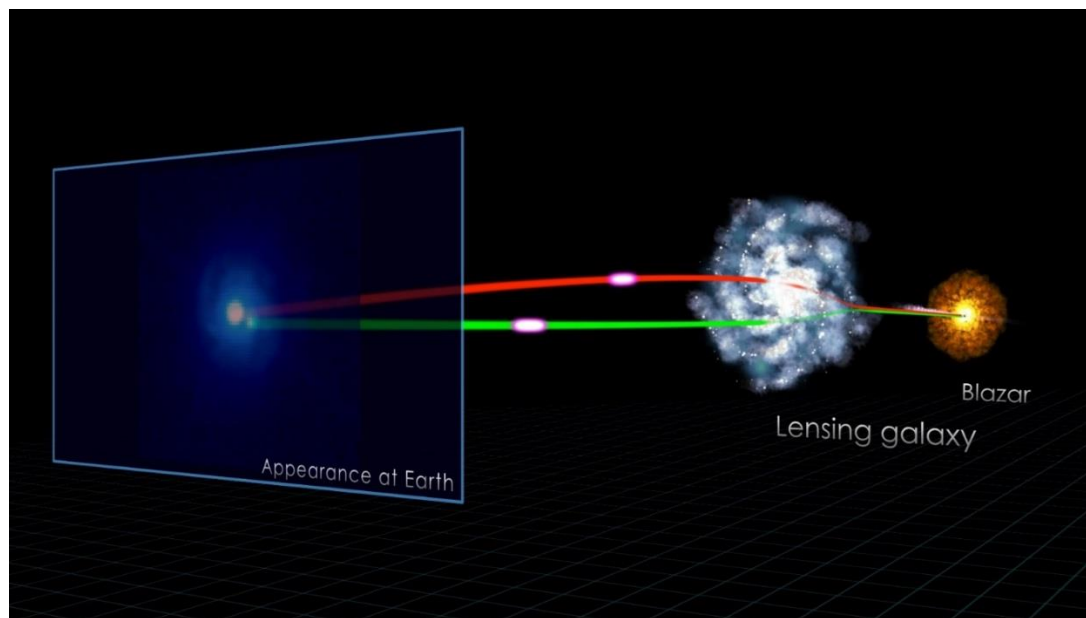


# MAGIC detection of sub-TeV emission from gravitationally lensed blazar QSO B0218+357

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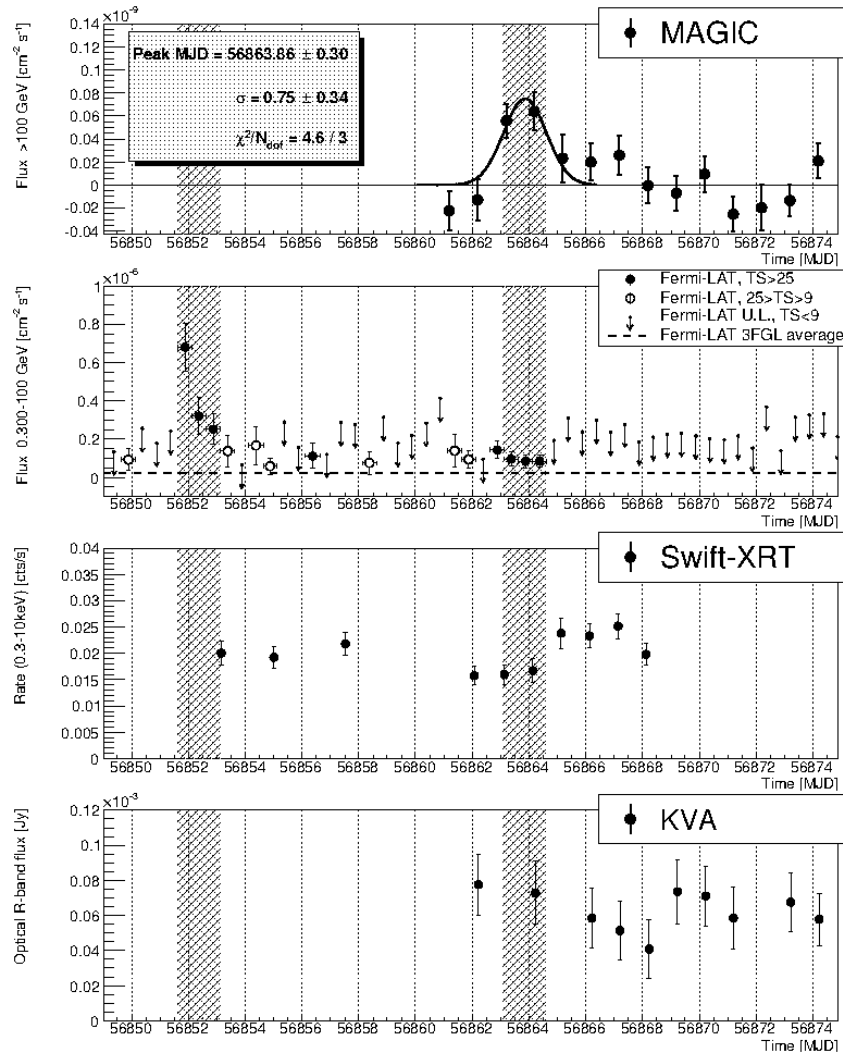
# QSO B0218+375



MAGIC angular resolution: 0.1 deg

- B0218+357: quasar lensing system with the smallest Einstein radius known (335 mas)
- MAGIC cannot spatially resolve the images which are resolved in radio and HST observations
- Lens galaxy:  $z = 0.6847$  (spiral, face-on)
- Blazar B0218+357:  $z = 0.944$
- Time-delay between the two images: around 11 days (10-12 days, depending on the energy range)

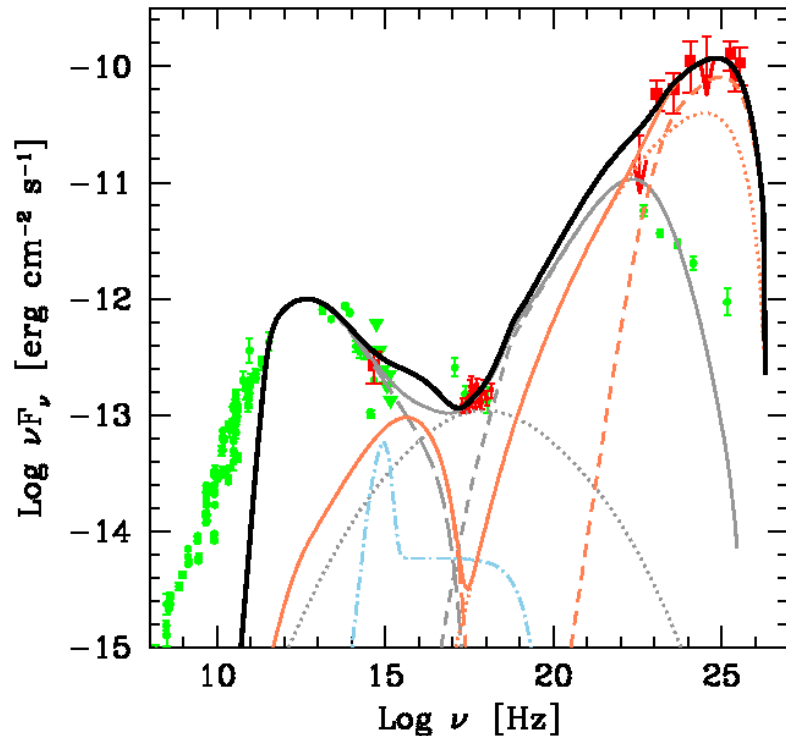
# MWL light curve of the July 2014 flare



Light curve of QSO B0218+357 during the flaring state in July/August 2014:

- MAGIC observed the delayed flare, leading emission could not have been observed due to the Full Moon
- *Fermi*-LAT observed higher flux ratio than in 2012
- Swift-XRT (X-rays) and KVA at La Palma (optical R band): no variability correlated with gamma-rays observed
- Possible microlensing?

# Broadband SED model of B0218+357



- Large separation of the two peaks
- Strong Compton dominance
- Variability in gamma-rays of the order of one day
- **Two-zone external Compton model**
- Gamma-rays (GeV and sub-TeV) are produced beyond the Broad Line Region (BLR) in EC – “Jet out”
- Sum of the SSC and EC components on the radiation field from BLR and dusty torus
- Optical and X-rays are produced within the BLR – “Jet in”

# Summary

- **MAGIC detected B0218+357 in only 2.11 hours with significance of  $5.7 \sigma$**
- **The only gravitationally lensed source detected in VHE gamma-rays**
- **One of the two farthest sources known in the VHE gamma-ray energy range: B0218+357 ( $z=0.944$ , detected 2014) and PKS1441+240 ( $z=0.938$ , detected 2015)**
- **Spectrum of B0218+357 is consistent with the current EBL models**
- **A two-zone model is required to explain the broad-band emission of B0218+357**