

# FACT Multi-wavelength and Multi-messenger Studies

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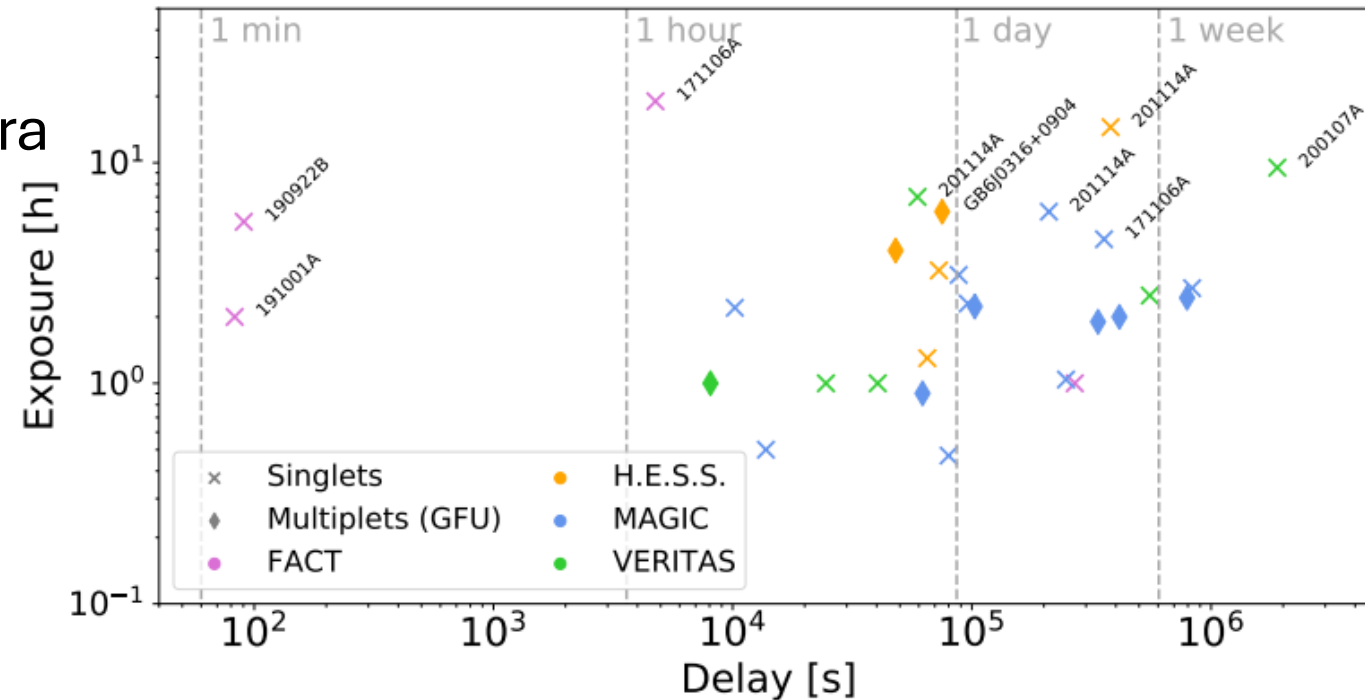


# First G-APD Cherenkov Telescope

- Imaging Air Cherenkov Telescope (IACT)
- Energy domain: TeV (gamma rays)
- Mirror area: 9.5 m<sup>2</sup>
- Silizium Photomultiplier (SiPM) camera
- Location: 2200 m a.s.l., La Palma, Canary Islands, Spain
- In operation since 2011
- **Observing strategy: Long-term monitoring of a small sample of bright TeV blazars + target of opportunity observations**



Anderhub, H. et al., Journal of Instrumentation (2013)

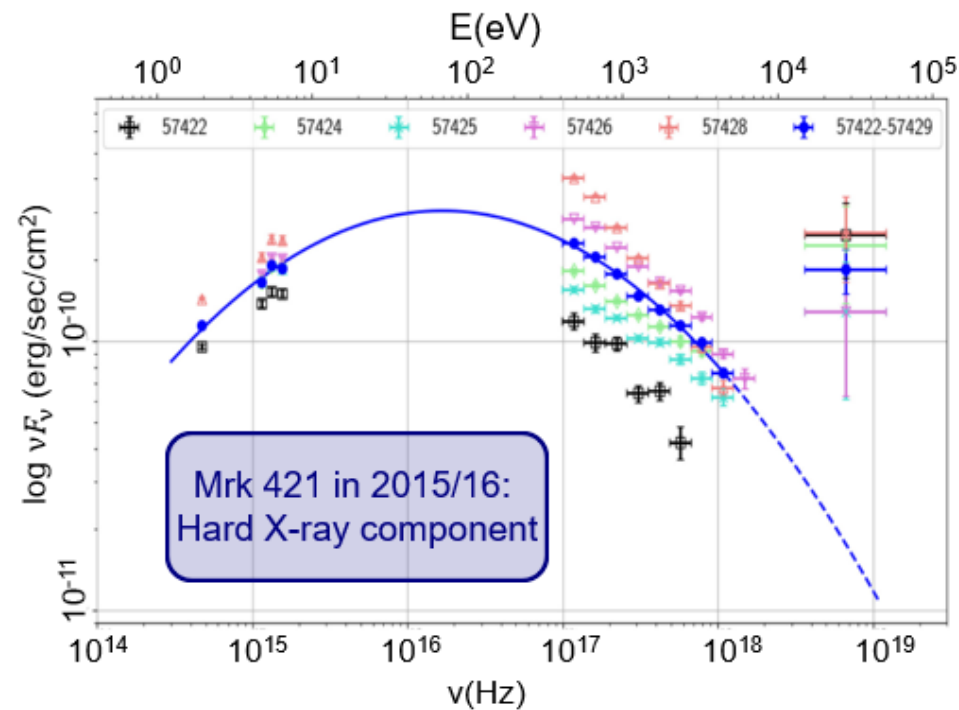


Satalecka et al. (multi Collab\*), PoS(ICRC2021) 960

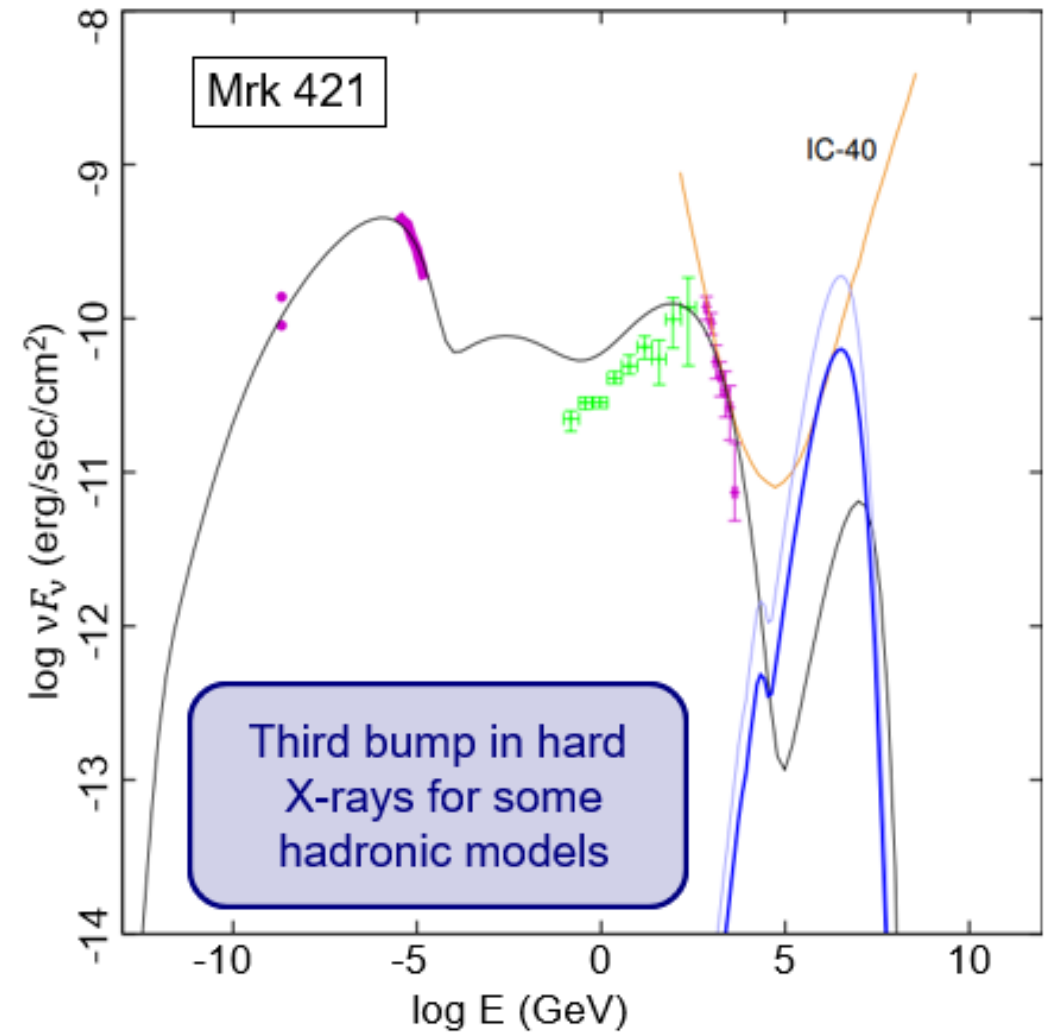


# Mrk 421

- Neutrinos are expected from hadronic models
- Joint observation of Mrk 421 at very high energies (VHE) and with *INTEGRAL*



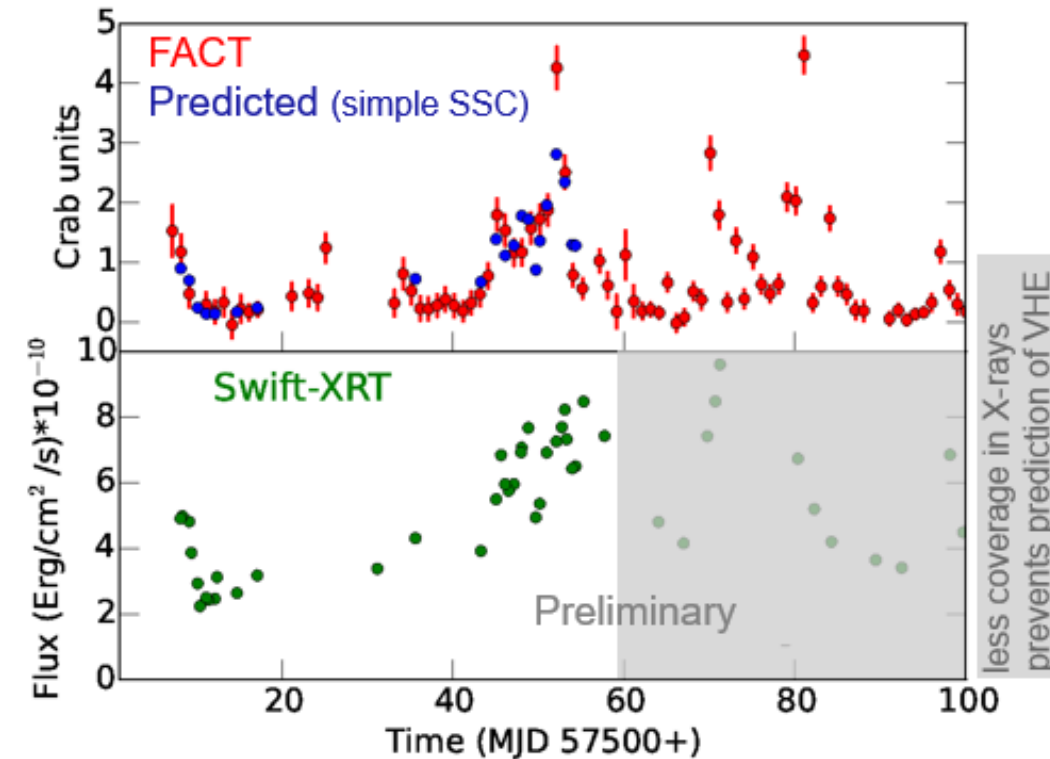
Acciari et al. (MWL), MNRAS, 504 (2021) 1427-1451



Mastichiadis, Galaxies, 4 (2016) 59(4)

# 1ES 1959+650 during the flaring activity in 2016

- Detection of two neutrinos from the direction of 1ES 1959+650 with AMANDA in coincidence with TeV flares seen by Whipple in June and July 2002  
→ **Continuous monitoring at TeV energies by FACT**
- Brightest outburst not explained by simple SSC model  
→ **Additional emission region or additional process (eg hadronic)**

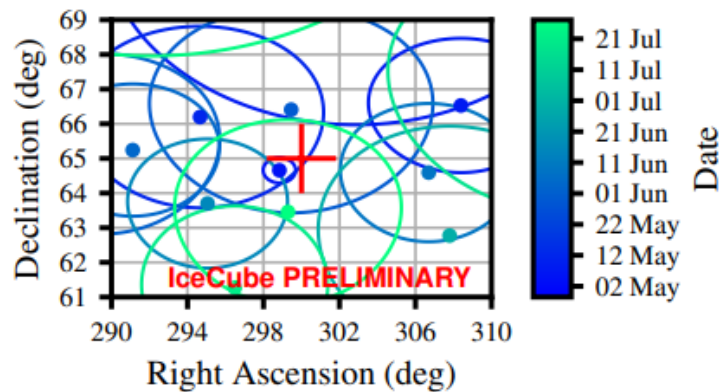


Brightest outburst not explained by simple SSC model

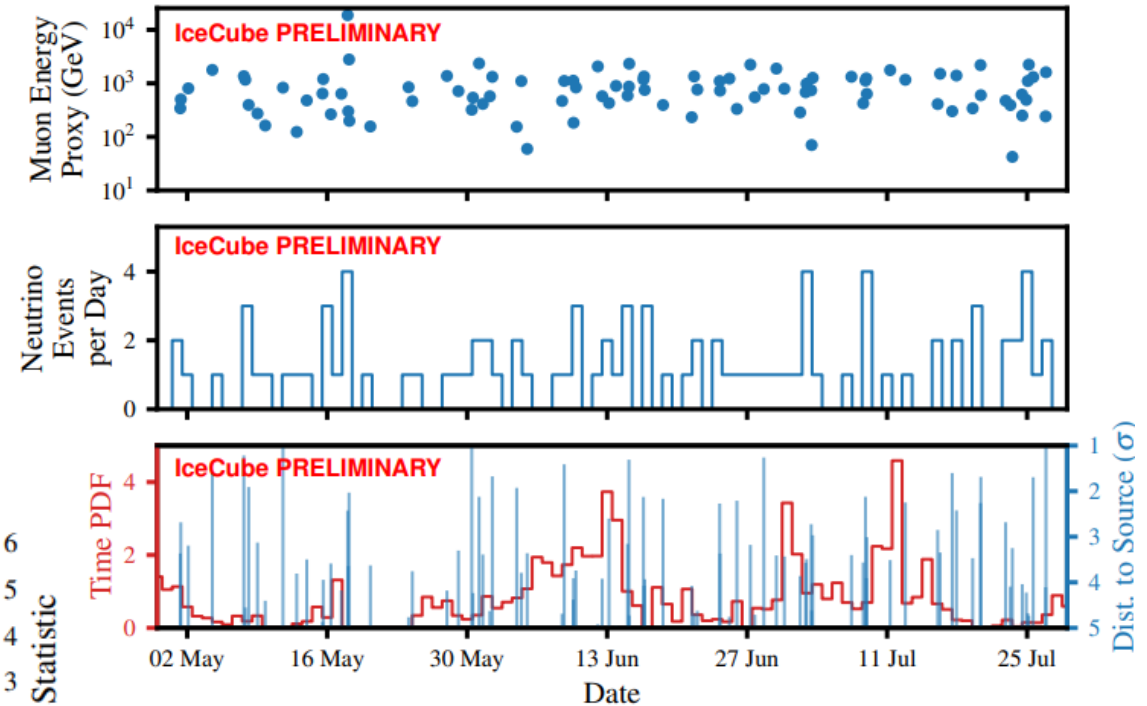
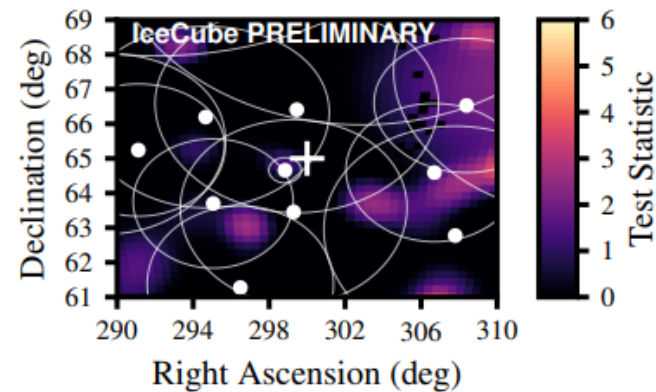
Dorner et al. (FACT Collab), PoS(ICRC2017) 608

# 1ES 1959+650 during the flaring activity in 2016

- Correlation study between neutrinos and gamma rays
- **No correlation found**



Kintscher (IceCube, FACT, MAGIC), PoS(ICRC2017) 969



Kintscher (IceCube, FACT, MAGIC), PoS(ICRC2017) 969





# Take-Home Message

## FACT

- Long-term monitoring in the multi-wavelength context
- Target-of-opportunity observations of multi-messenger alerts

## Correlation of neutrinos and gamma rays

- Search for signatures in the multi-band spectral energy distribution
- Correlation studies in multi-messenger light curves and skymaps



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