

First-time detection of VHE gamma rays by MAGIC from a direction consistent with the recent EHE neutrino event IceCube-170922A

Michele Doro

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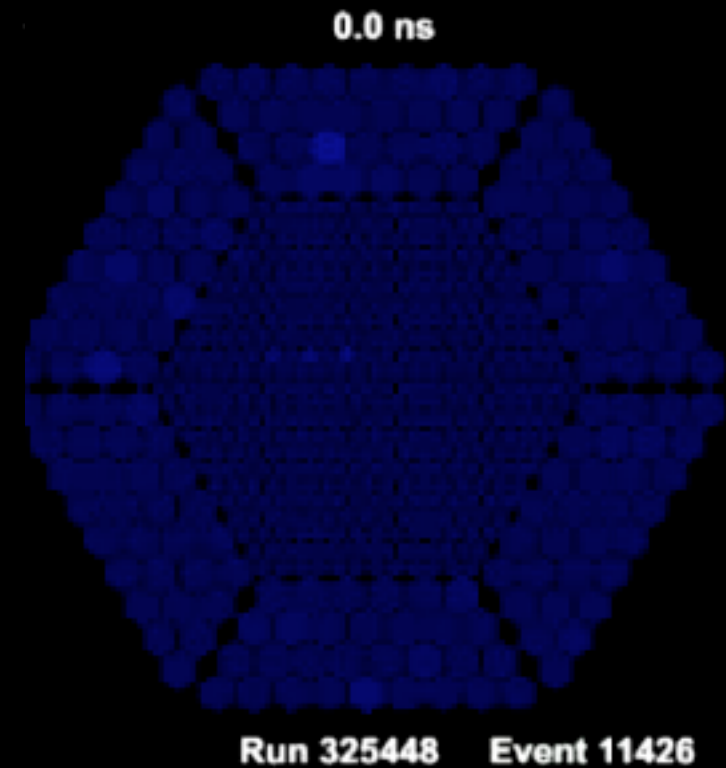


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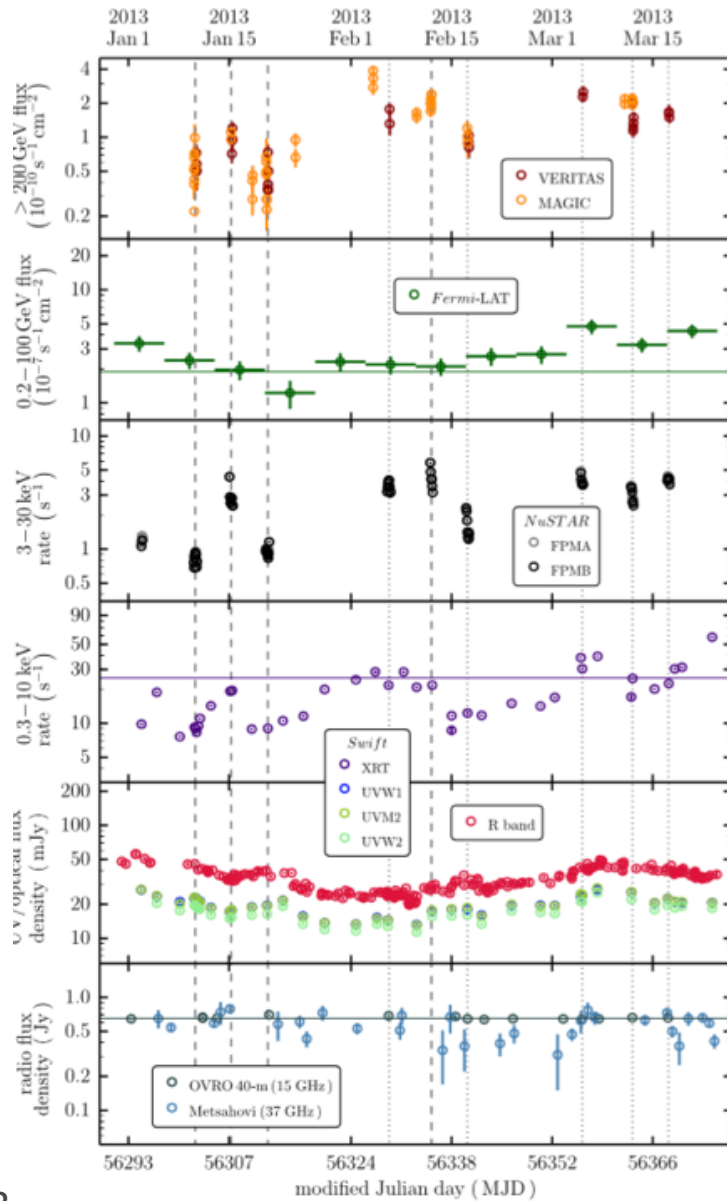


M. Doro - MAGIC telescope: gamma-rays and neutrinos.
Padova 25/10/2017

Cherenkov Light from Atmospheric Showers

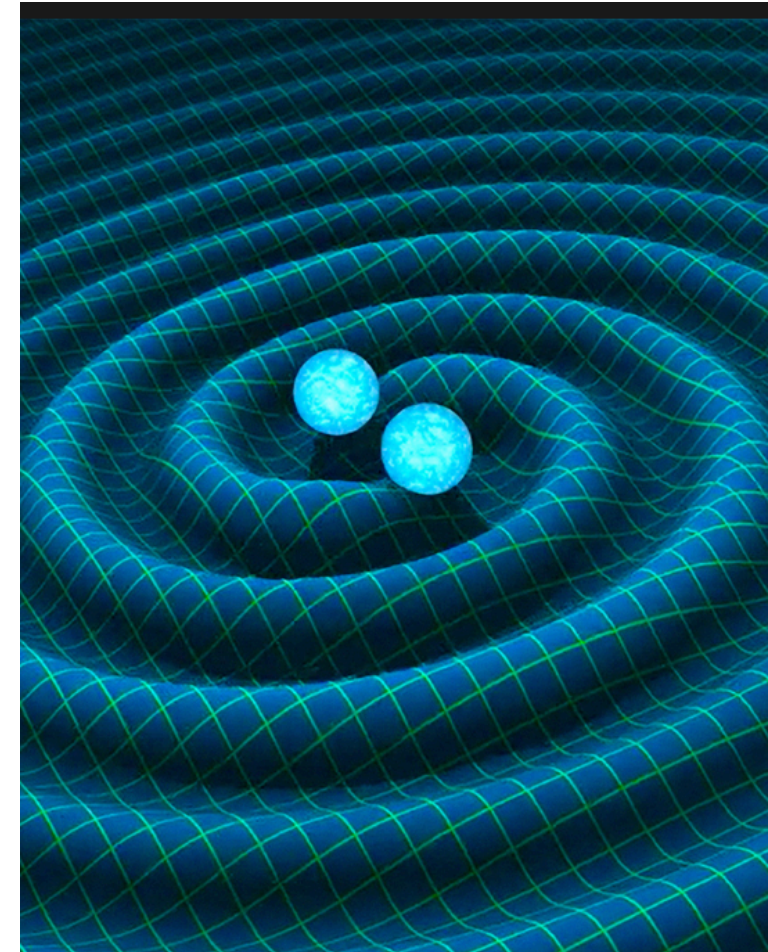
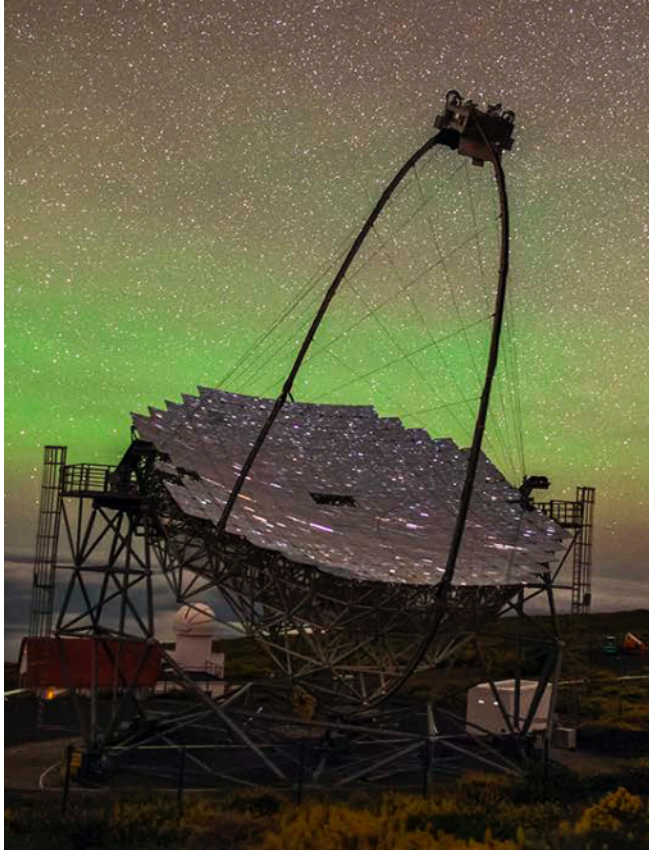


MAGIC designed for fast trigger response

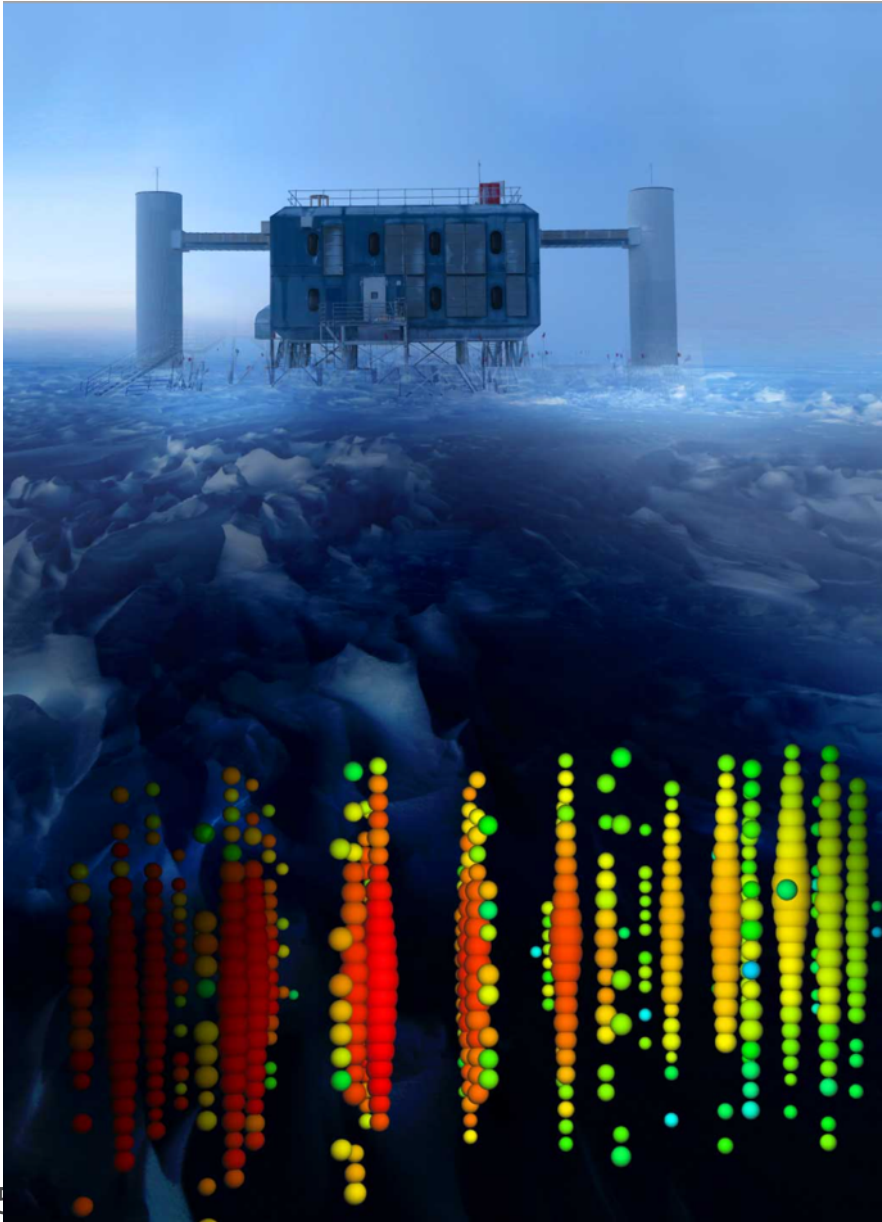


- Very interesting to track variable sources
 - Over long time
 - multi-wavelengths!
- This is done with **fast alert trigger networks!**
- We have such agreements with **ICECUBE, LIGO/VIRGO, etc**



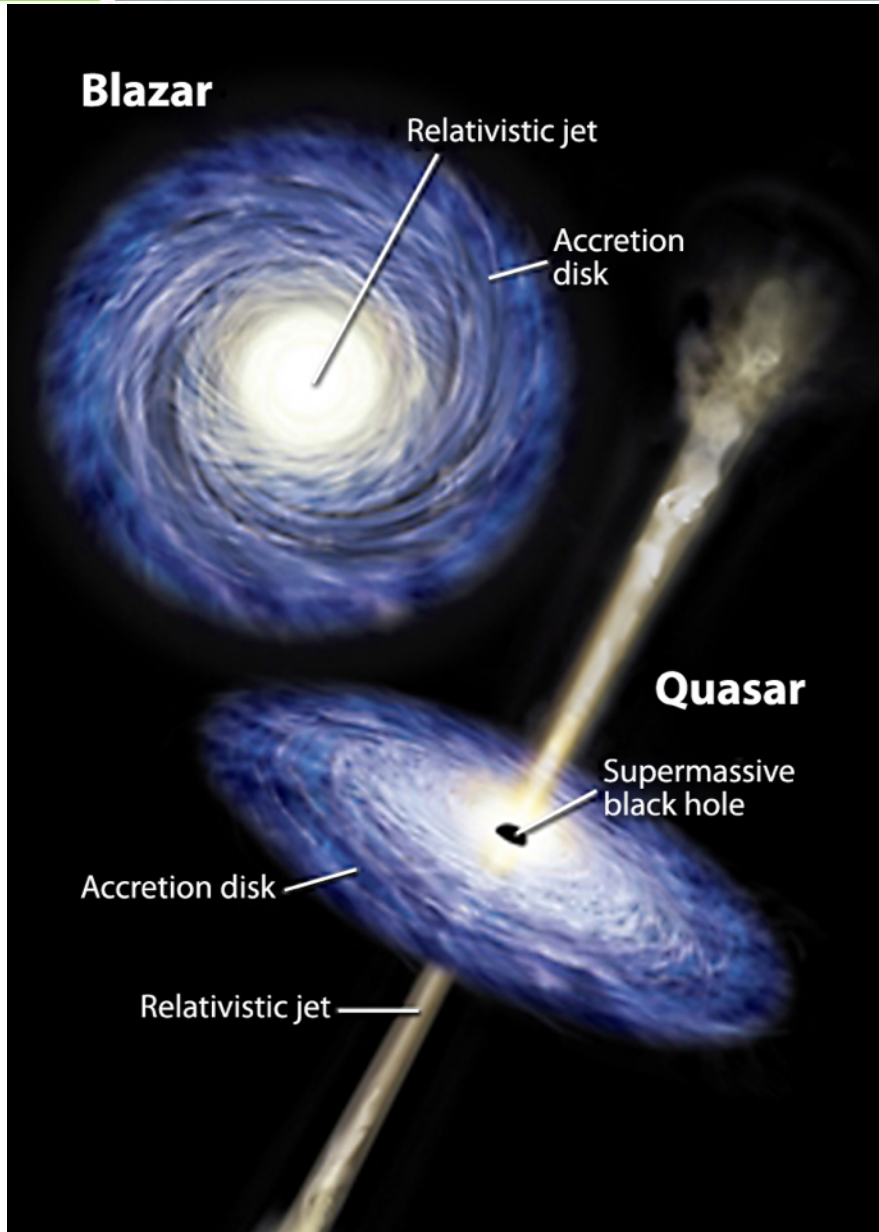


One nice neutrino from IC

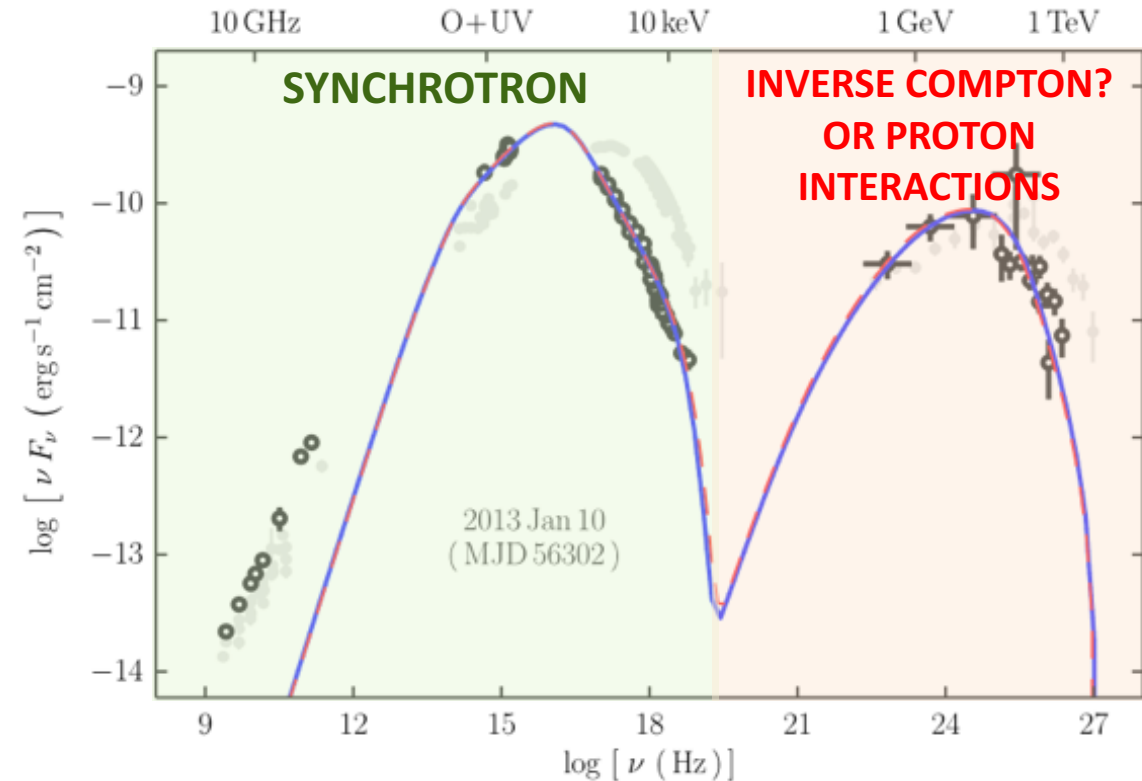


- IC-160427A → no signal
- IC-160731A → no signal
- IC-170321A → no signal
- **IC-170922A → yes!**
 - IC-170922A was monitored September 22nd, but at the begin **it was NOT seen.**
 - However, it was detected **some days later together with an alert from the GeV Fermi-LAT satellite**
 - 656 ± 93 events at TeV!

GeV light from a blazar



- Fermi-LATs saw increased activity in the direction of the IceCube neutrino where a **known blazar** is located: QSO J0509+0541



- Q: Do we expect neutrino and gamma-rays at the same time?**
- R: yes! When hadrons interactions are happening!**

Huge discovery!

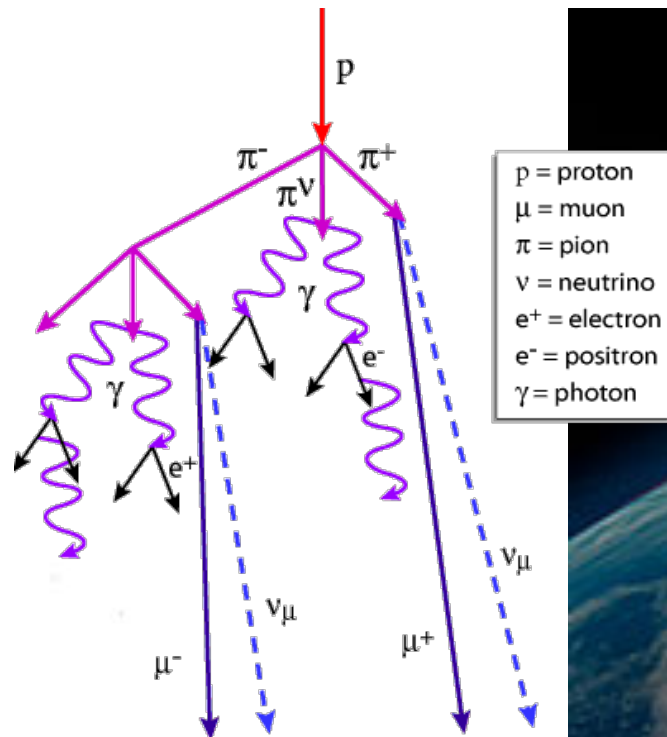


- This would be the smoking gun for **discovery of PeV+ protons in blazar jets**
- By clearing the jets mechanisms we have unique **insights on the Super Massive Black Hole dynamics** at the center of galaxies
- Because of embargos, I cannot show any MAGIC result...
- Several things to check:
 - Timing between events
 - Energetics
 - Chances of peculiarity

BUT...

A new era

- Gravitational Waves, Neutrinos and Gamma-rays: **the multi-messenger era has started**
- Gamma rays are unique probe to test particle interactions and dynamics at black holes





Backups

Further reading: the MAGIC Atel discovery

<http://www.astronomerstelegam.org/?read=10817>

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25 Oct 2017; 14:43 UT

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ATel #10817; *Razmik Mirzoyan for the MAGIC Collaboration*
on 4 Oct 2017; 17:17 UT

Credential Certification: Razmik Mirzoyan (Razmik.Mirzoyan@mpp.mpg.de)

Subjects: Optical, Gamma Ray, >GeV, TeV, VHE, UHE, Neutrinos, AGN, Blazar

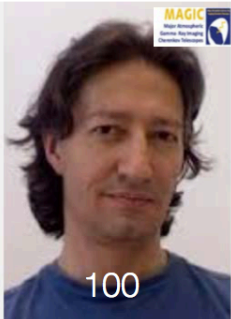




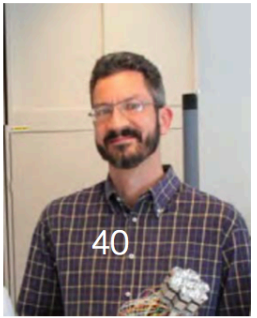


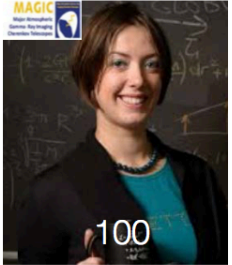
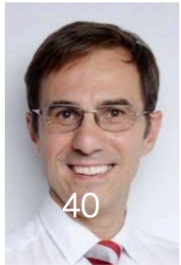








Referred to by ATel #: [10830](#), [10833](#), [10838](#), [10840](#), [10844](#), [10845](#)

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- 10890 [Subaru/FOCAS Optical Spectroscopy for a possible IceCube-170922A counterpart TXS 0506+056](#)
- 10861 [VLA Radio Observations of the blazar TXS 0506+056 associated with the IceCube-170922A neutrino event](#)
- 10845 [Joint Swift XRT and NuSTAR Observations of TXS 0506+056](#)
- 10844 [Kanata optical imaging and polarimetric follow-ups for possible IceCube counterpart TXS 0506+056](#)
- 10840 [VLT/X-Shooter spectrum of the blazar TXS 0506+056](#)

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