MAGIC and H.E.S.S. detect VHE gamma rays from the blazar OT081 for the first time: a deep multiwavelength study

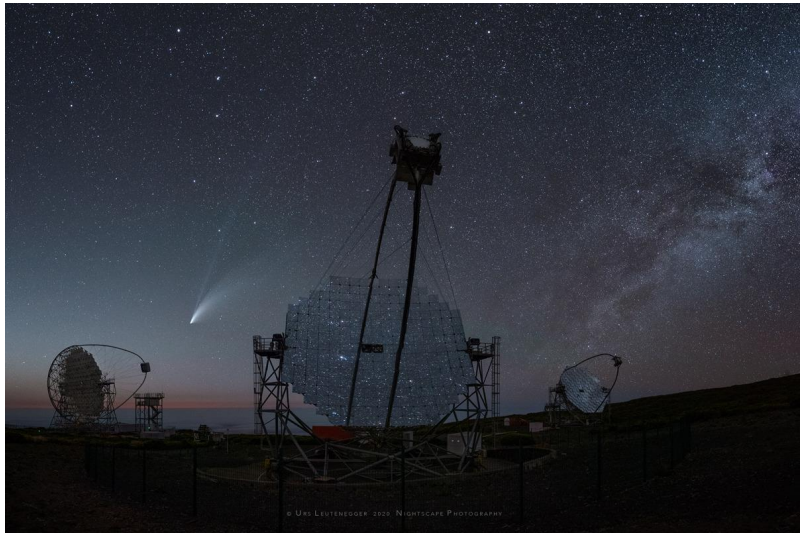

Image Credit: Urs Leutenegger (@urs.leutenegger)

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On behalf of the MAGIC, H.E.S.S. and *Fermi*-LAT collaborations

A multi collaboration and multiwavelength team

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Summary of the work

- OT 081 (a.k.a. PKS 1749+096) is a blazar located at z=0.322
- The discovery of VHE γ-ray emission happened during a very bright flare triggered by *Fermi*-LAT and observed by many instruments simultaneously in July 2016.
- In a paper in preparation, we present the first broadband study of the source which includes VHE gamma-ray data, taken by MAGIC and H.E.S.S. arrays.

H.E.S.S.

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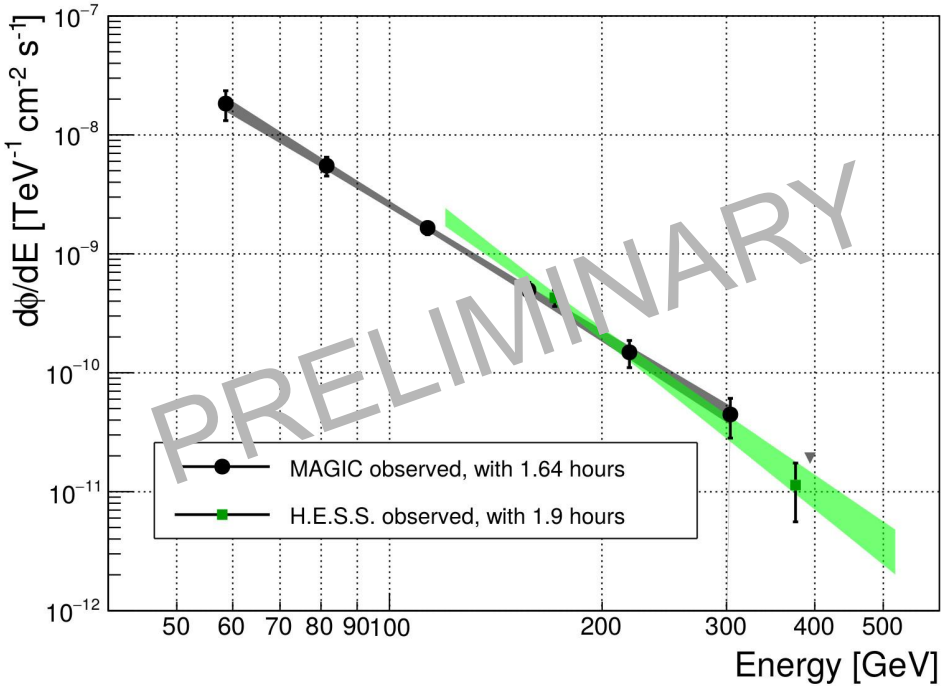
VHE spectra during the flare

MAGIC and H.E.S.S.

- **VHE flare: 22-24th July**

Exp.	T_{obs} [MJD]	T_{eff} [hr]	E_{th} [GeV]	E_{dec} [GeV]
MAGIC	57593	1.64	57	125
H.E.S.S.	57591-57593	3.1	119	173



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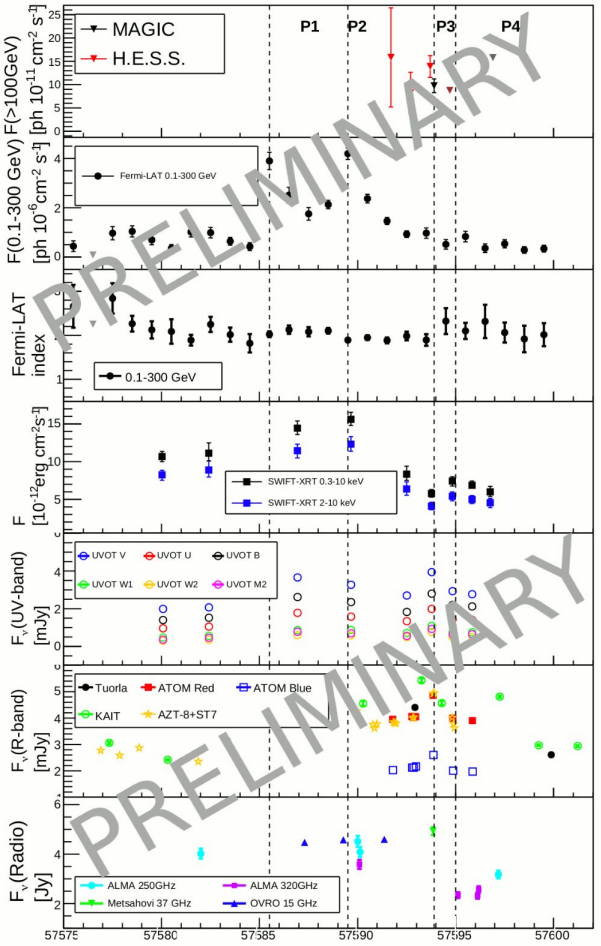
We selected four states of activity

indicated as P1, P2, P3 and P4

-A rich dataset

- P1 indicates a high state in *Fermi*
- P2 high state in *Fermi*-LAT and Swift-XRT
- P3 VHE gamma-ray detection by MAGIC
- P4 low state apart from some optical activity



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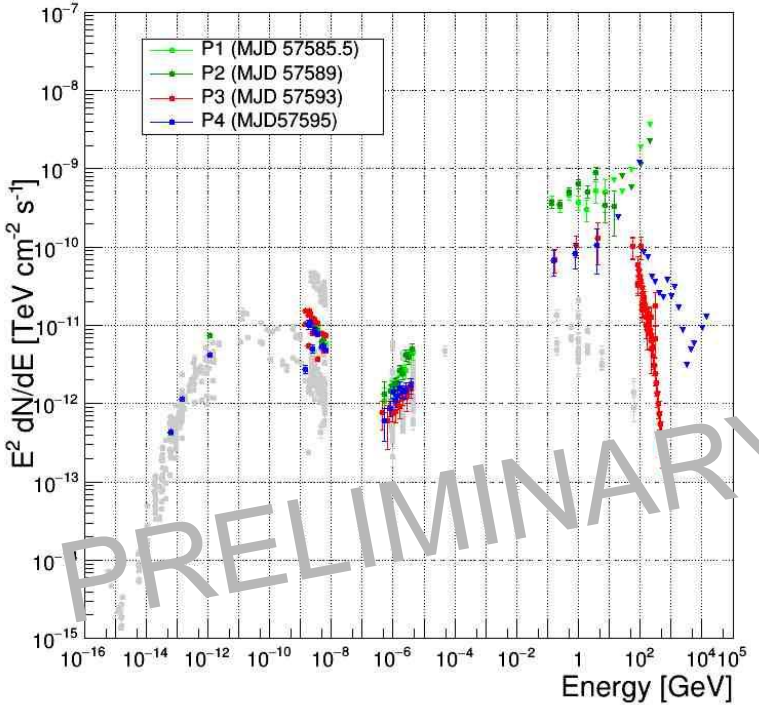
MWL SEDs from different source states

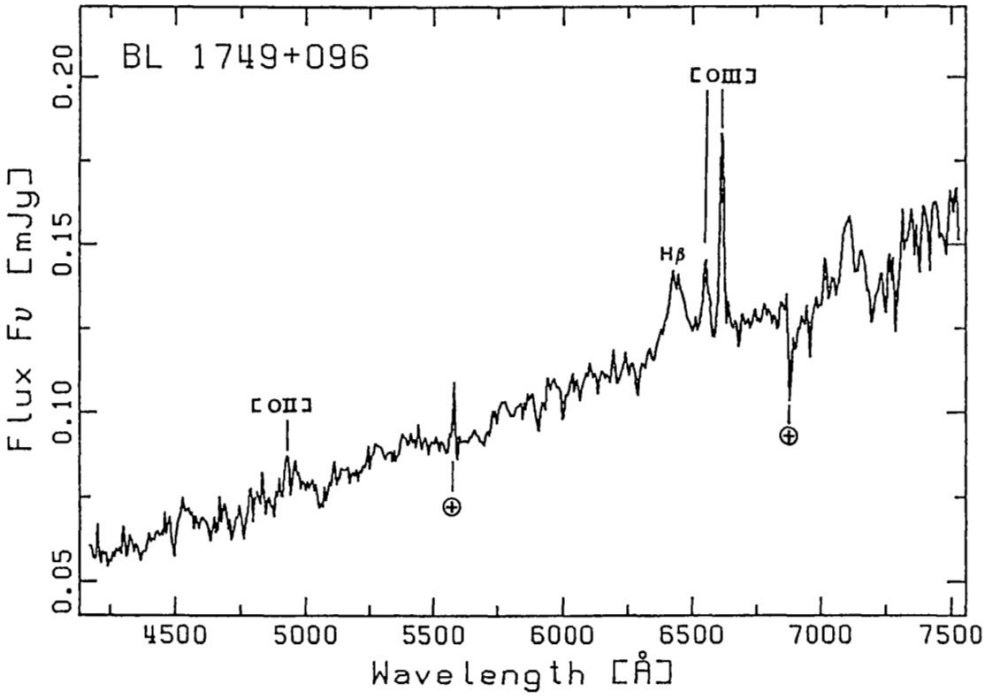
- Several trials of a simple SSC model were not successful in describing the dataset.
- The high energy bump of the SEDs can not be explained by Compton scattering of low-energy photons by the same electrons producing the synchrotron emission at lower frequencies …



Including external fields

Luminosity of the β line to be used as value for the external photon field

- **H_β -> Line_lum= 5.x10^41 erg/s**

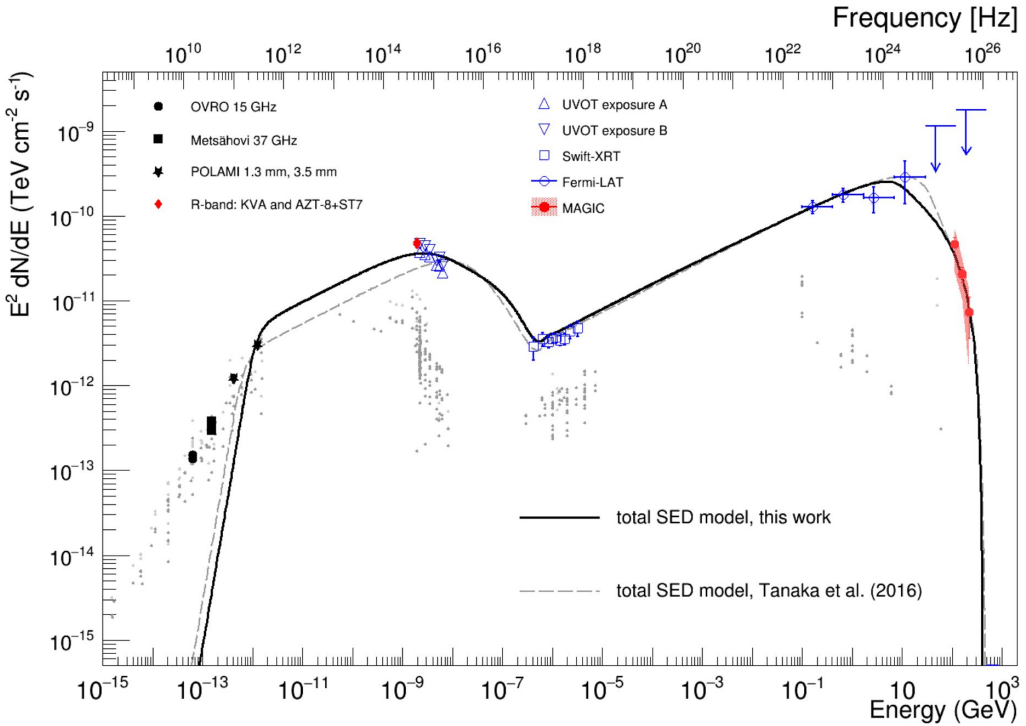


Optical spectrum from Stickel et al., 1988

Similar case to S4 0954+65

For S4 0954+65,

IR torus emission was assumed as external photon field



MAGIC collaboration, (2018) A&A 617, A30

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Conclusions

- The Inverse Compton part of the SED has been investigated for the first time using VHE gamma-ray data.
- The discovery of VHE γ-ray emission happened during a very bright flare triggered by *Fermi*-LAT and observed by many instruments simultaneously in July 2016.
- We present the first broadband study of the source which includes VHE gamma-ray data, taken by MAGIC and H.E.S.S. arrays.
- The dataset challenges pure leptonic models.
- The presence of emission lines in the optical spectrum and the considerations drawn from the modeling point to the fact that the source is not a pure BL Lac but a transitional source between BL Lac and FSRQs.

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Thanks for your attention!

Image Credit: Chiara Righi (@chirighi)

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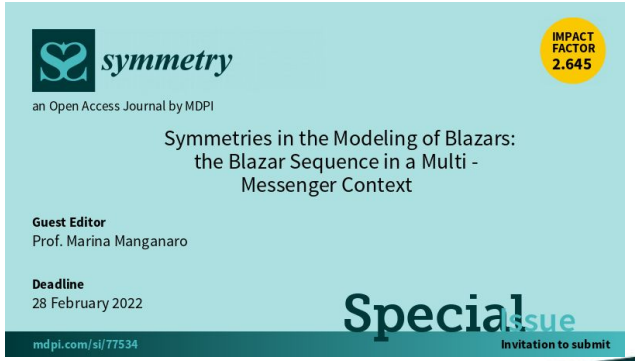
- Acceleration of particles



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