



Contribution ID: 130

Type: Talk

## Recent observations of PKS 2155-304 with MAGIC and LST-1 in a multi-wavelength context

*Friday 18 July 2025 17:20 (15 minutes)*

PKS 2155-304 is a well-known high-frequency peaked BL Lac (HBL) at redshift  $z=0.116$ , which has been extensively studied across the electromagnetic spectrum due to its rapid and large-amplitude variability. Several violent outbursts in X-rays and gamma rays have been observed in the past, with intra-night variability in very-high-energy gamma rays (VHE;  $E > 100$  GeV) detected down to the minute timescale. The alternation of quiescent and enhanced states, observed with a tentative quasi-periodicity of  $1.74 \pm 0.13$  years in high-energy (HE;  $100$  MeV  $< E < 100$  GeV) gamma rays, makes this source a key target also for ground based gamma-ray instruments and in particular for the Imaging Atmospheric Cherenkov Telescopes. Its brightness, proximity, and well-determined redshift make this gamma-ray source a prime target for fundamental physics studies, including Lorentz Invariance Violation constraints, searches for axion-like particles, and studies of absorption on the extragalactic background light.

In the last two years, PKS 2155-304 has been independently monitored by the Major Atmospheric Gamma-ray Imaging Cherenkov (MAGIC) telescopes and the first Large-Sized Telescope (LST-1) of the Cherenkov Telescope Array Observatory located at the Roque de Los Muchachos Observatory (La Palma, Spain). The observations were carried out at large zenith angles (LZA;  $ZA > 55^\circ$ ) and the VHE data have been complemented by simultaneous observations in HE gamma rays (Fermi-LAT), X-rays (Swift-XRT) and optical wavelengths (ASAS-SN).

In this contribution, we present the long-term behaviour and discuss the emission mechanisms of PKS 2155-304. By integrating data from different instruments, we characterize the spectral energy distribution of the source and explore correlations between wavebands, thereby constraining particle acceleration mechanisms in blazar jets.

The analysis characterises the VHE gamma-ray spectral properties of PKS 2155-304, while the multi-wavelength comparisons reveal key trends in the activity of the source. These results lay the groundwork for future studies with next-generation Cherenkov telescopes.

### Collaboration(s)

**Author:** NIKOLIĆ, Lisa (University of Siena & INFN Pisa)

**Co-authors:** MANGANARO, Marina (University of Rijeka); CERASOLE, Davide (University and INFN Bari); VERNA, Gaia (University of Siena and INFN Pisa); SILVESTRI, Giuseppe (University of Padova); OTERO SANTOS, Jorge (University of Padova); AGUDO, Ivan (IAA - CSIC); SCHIAVONE, Francesco (University and INFN Bari); PODOBNIK, Franjo (University of Siena & INFN Pisa); Dr BONNOLI, Giacomo (Università degli Studi di Siena & INFN Pisa)

**Presenter:** NIKOLIĆ, Lisa (University of Siena & INFN Pisa)

**Session Classification:** GA

