

Unraveling the complex nature of the very high-energy gamma-ray blazar PKS 2155-304

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PKS 2155-304 is a blazar located in the Southern Hemisphere, monitored with the High Energy Stereoscopic System (H.E.S.S.) at very high energy (VHE) gamma rays every year since 2004. Thanks to the large data set collected in the VHE range and simultaneous coverage in optical, ultraviolet, X-ray and high energy gamma-ray ranges, this object is an excellent laboratory to study spectral and temporal variability in blazars. However, despite many years of dense monitoring, the nature of the variability observed in PKS 2155-304 remains puzzling.

In this presentation, I will discuss the complex spectral and temporal variability observed in PKS 2155-304. I will focus on the VHE gamma-ray data collected with H.E.S.S. starting in 2013, and which is complemented with multi-wavelength observations from Fermi-LAT, Swift-XRT, Swift-UVOT, SMARTS, the Steward Observatory, and the ATOM telescope. I will also discuss the complexity of the temporal evolution of the broadband emission with a special focus on the presence of different kinds of flaring activity, including orphan outbursts. The theoretical implications are manifold, ranging from acceleration and emission processes to different locations of the emission regions. I will also demonstrate the importance of dense, multi-wavelength monitoring that is needed to fully characterize the behaviour of PKS 2155-304.

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