INFLUENCE OF ATMOSPHERIC CONDITIONS ON OBSERVATIONS WITH IMAGING ATMOSPHERIC CHERENKOV TELESCOPES AND MULTI-WAVELENGTH ANALYSIS OF THE FLARING BLAZAR B2 1811+31

Abstract

This seminar is based on data analysis from the MAGIC Collaboration Database and explores the sensitivity of the MAGIC telescope's camera to variations in the Night Sky Background (NSB). LIDAR atmospheric monitoring data was used to examine the relationship between atmospheric transmission and the telescope's response under different conditions, including varying azimuths and levels of artificial light pollution.

Special attention was given to the role of clouds, with photon rate calibration showing that low-altitude clouds significantly reduce telescope sensitivity, while high clouds have minimal effect. These findings were supported by extensive air shower simulations using the CORSIKA code and are especially relevant for future observations under the CTAO-N project.

For the study of Active Galactic Nuclei (AGN), such as blazars that emit very-high-energy gamma rays, atmospheric clarity is crucial. The Cherenkov technique depends on atmospheric transparency to accurately detect secondary light from particle showers, making cloud coverage and atmospheric conditions a key factor in observation quality.

The seminar includes a detailed analysis of the 2020 gamma-ray flare from the source B2 1811+31, which marked the first detection of very-high-energy gamma rays from this object by the MAGIC telescopes. Multiwavelength observations suggest a transition to a high-energy peaked blazar state during the flare, with a two-zone synchrotron self-Compton model providing the best fit to the emission data.