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First study of Mrk501 through the eyes of NuSTAR, VERITAS and the {\it LIDAR-corrected} eyesight of MAGIC

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The blazar Mrk501 is among the brightest X-ray and TeV sources in the sky, and among the few sources whose (radio to VHE gamma-rays) Spectral Energy Distributions can be characterized by current instruments by means of relatively short observations (minutes to hours). In 2013, we organized an extensive multi-instrument campaign involving the participation of Fermi LAT, MAGIC, VERITAS, F-GAMMA, Swift, GASP-WEBT, and other collaborations/groups and instruments which provided the most detailed temporal and energy coverage on Mrk501 to date. This observing campaign included, for the first time, observations with the Nuclear Stereoscopic Telescope Array, NuSTAR, which is a satellite mission launched in mid-2012. NuSTAR provides unprecedented sensitivity in the hard X-ray range 3-79 keV, which, together with MAGIC and VERITAS observations, is crucial to probe the highest energy electrons in Mrk501.

The multi-instrument campaign covered a few day long flaring activity in July 2013 which could be studied with strictly simultaneous NuSTAR and MAGIC observations. A large fraction of the MAGIC data during this flaring activity were affected by a sand layer from the Saharan desert, and would have been removed in any standard Cherenkov Telescope data analysis. However, we were able to use atmospheric information from a LIDAR facility that is operational at the MAGIC site, and apply an event-by-event correction in order to reliably use these data. This is the first time that LIDAR information is used to produce a physics result with Cherenkov Telescope data taken during adverse atmospheric conditions, and hence sets a precedence for the current and future ground-based gamma-ray instruments.

In the conference we will report the observational results, focusing on the LIDAR-corrected MAGIC data and the strictly simultaneous NuSTAR and MAGIC/VERITAS data, and will discuss the scientific implications.

Collaboration

– not specified –

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