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Exploring the Most Extreme Blazars: New Insights from MAGIC

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Extremely high-peaked BL Lac objects (or extreme blazars) are unique extragalactic laboratories where particle acceleration processes are pushed at their physical limits. In these blazars, synchrotron emission peaking above keV energies is reprocessed to very-high-energy (VHE, energies > 100 GeV) gamma rays, often resulting in very hard TeV spectra. Over the past two decades, they have attracted a growing interest from the scientific community, both experimentally and theoretically, as crucial targets for understanding the diversity within the blazar class.
On the experimental side, new sources have been detected and characterized, populating the extreme blazars class. Notably, VHE campaigns have revealed evidence of emerging spectral differences in this energy band, suggesting inhomogeneity within this class of sources. Recent studies have also unveiled intriguing differences in the temporal evolution of their spectral emission. On the theoretical side, these spectral differences are challenging the current standard emission and acceleration models for blazars, suggesting the need for more complex theoretical frameworks.
In this contribution, we present the latest results from recent MAGIC Collaboration observing campaigns aimed to enlarge the extreme blazars population at VHE and understand the origin of their extreme properties. Furthermore, we will present the results of the most recent observations, discussing analogies and differences with well-known sources such as the archetypal 1ES 0229+200, as well as interpretations of their non-conventional spectral emission.

Collaboration(s)

MAGIC Telescopes Collaboration

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