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VHE extragalactic results and perspectives from ground based instruments

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The very high energy (VHE, $E > 100$ GeV) extragalactic sky is being slowly populated, nowadays it is composed of around 90 targets. Blazars are clearly the dominant population, while some radio galaxies and gamma-ray bursts are spicing the study of the extreme Universe. The study of the intrinsic characteristics of their relativistic jets allow us to test extreme physical process, as well as can be used as cosmic lighthouses for the study of cosmological backgrounds tightly connected to the Universe evolution as the extragalactic background light (EBL) and the intergalactic magnetic field (IGMF). Of particular interest is the study of fast variability, pointing to extreme acceleration processes and, together with the study of the multi-frequency information might point to the need to more complicated structured jets w.r.t. the classical models. The detection of flat spectrum radio quasars (FSRQs) allow us to test the AGN structure and its influence in the gamma-ray observations. Some transitional VHE blazars are being detected, sharing some characteristics across FSRQs and BL Lac objects. The hunting of extreme blazars is also one of the key topics to be investigated, as their emission peaks should be located at the VHE band. In this contribution, we will briefly mention the current status of these hot topics together with some perspectives for the future ground based gamma-ray instruments.

Summary

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