

Very High Energy Emission from Gamma-Ray Bursts: Insights from 15 Years of H.E.S.S. Observations

The detection of Gamma-Ray Bursts (GRBs) at Very High Energy (VHE, $E > 100$ GeV) was a long-awaited result that required years of dedicated observational efforts. This work presents a comprehensive re-analysis of 15 years of GRB data collected by the High-Energy Stereoscopic System (H.E.S.S.), establishing a robust set of VHE upper limits. Our analysis explores the nature of VHE emission by demonstrating that the small set of detected events from the last decade do not constitute a unique population; rather, they represent particularly luminous bursts occurring at low redshifts. By integrating H.E.S.S. limits with multi-wavelength datasets for the most significant events, we modelled afterglow emission to constrain the microphysical parameters within standard VHE emission frameworks. These findings provide a baseline for the future capabilities of the Cherenkov Telescope Array Observatory (CTAO), particularly in the context of multi-messenger synergies with the next generation of observatories and missions.