Contribution ID: **32** Type: **Talk**

# Revisiting Two Decades of GRB Observations: Assessing Missed Very High-Energy Detections and Future Prospects

*Monday 21 July 2025 17:35 (15 minutes)*

Gamma-ray bursts (GRBs) are bright flashes of electromagnetic radiation originating from the core collapse of massive stars or the merger of compact objects. It has long been theorized that GRBs can emit very high-energy (VHE) gamma rays that can reach the TeV level. Although current-generation Imaging Atmospheric Cherenkov Telescopes (IACTs), such as H.E.S.S., have been observing GRBs since 2002, the first detection of GRBs by IACTs occurred only 16 years later, in 2018, raising the question of why no detections were made during these years. We investigate all GRBs detected by the Swift Observatory with redshift measurements over the past two decades. Using the phenomenological relationship between X-ray and gamma rays and taking into consideration EBL absorption effects and instrument response functions, we search for any missed opportunities for GRBs that could have been detected by the three IACTs: H.E.S.S., MAGIC, and VERITAS, and present the best candidates. We find that the missing detections can be explained by the low rate of detectable GRBs at VHE, which we quantify as < 1 per year. We also find that with the future Cherenkov Telescope Array Observatory (CTAO), this rate can increase to 4 per year.

## Collaboration(s)

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**Session Classification:** GA

**Track Classification:** Gamma-Ray Astrophysics