Contribution ID: **1343**

Type: **Poster**

Search for Muon Excess from GRB 221009A in Data from the GRAPES-3 Muon Telescope

Gamma-ray bursts (GRBs) are among the most energetic phenomena in the universe, attracting significant interest not only in astronomy but also in the field of particle physics.

GRB 221009A is the most energetic gamma-ray burst ever observed. A possible related phenomenon was reported as an increase in the muon detection rate by the Yangbajing Muon Telescope, which is installed at the Yangbajing International Cosmic Ray Observatory (altitude: 4,300 m, 90°E, 30°N).

In this report, the authors suggested an investigation using data from the GRAPES-3 Muon Telescope, located in Ooty, India (altitude: 2,200 m, 76.7°E, 11.4°N). GRAPES-3 is not only situated at a high altitude, similar to Yangbajing, but also has a relatively close longitude (90°E and 76.7°E) and a somewhat similar latitude. This suggests that it could have observed GRB 221009A under comparable conditions.

In this study, we analyzed data from the GRAPES-3 Muon Telescope based on this suggestion. In this paper, we present the results of our investigation and discuss the temporal profile of the muon counting rate in relation to the GRB event.

Collaboration(s)

GRAPES-3

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Session Classification: PO-2

Track Classification: Gravitational Wave, Multi-Messenger & Synergies