Contribution ID: **26** Type: **Talk**

Development of a Second-Level Trigger for the Autonomous Detection of Air-Shower Radio Emission

Saturday, November 26, 2022 9:00 AM (15 minutes)

The Giant Radio Array for Neutrino Detection (GRAND) is a future observatory with unprecedented sensitivity to ultra-high energy (UHE) neutrinos. UHE neutrinos and cosmic rays (CR) induce extensive air showers (EAS) when they enter Earth's atmosphere. These EAS emit radio signals, which offer information on the mass, energy and arrival direction of the incoming CR.

GRAND is planned as a network of radio detection antennas, covering a total area of 200 000 km^2, with one antenna per square kilometer. The antennas are designed to measure radio signals emitted by EAS in the range of $50 - 200$ MHz. They will be deployed on mountain slopes, creating a structure that is optimized for detecting inclined air showers. Currently, the GRANDProto300 (GP300) experiment is being developed as a pathfinder for GRAND. It will consist of 300 detection units, distributed across an area of 200 km^2 at high altitude. GP300 is specifically designed for the measurement of very inclined air showers of zenith angles $> 70^\circ$ at ultra-high energies. Its main goals are to demonstrate the GRAND detection principle and to offer insights on the scalability of the trigger.

Radio measurements are highly affected by anthropic signals, which can be several orders of magnitude more frequent than EAS. In order to reliably distinguish EAS events from noise, the NUTRIG project is developing an efficient and autonomous radio trigger, which will be verified with GP300. The first-level trigger describes the selection of an antenna signal, while the second-level trigger refines this selection according to information of all antennas triggered during the same event. This talk will cover the concept of the GRAND experiment and give an overview of the development of a second-level trigger for the autonomous detection of air shower radio emission.

Category

Particle / Astroparticle / Cosmology (Experiment)

Author: PETEREIT, Jelena (KIT)

Co-authors: Dr HUEGE, Tim (KIT); Dr ROTH, Markus (KIT, Germany); GÜLZOW, Lukas (KIT)

Presenter: PETEREIT, Jelena (KIT)

Session Classification: Physics Talks - Astroparticle Physics

Track Classification: Physics talks