



ID de Contribution: 29

Type: Oral presentation

Particle content of inclined cosmic-ray air showers for radio signal modeling

jeudi 29 février 2024 17:00 (15 minutes)

Ultra high energy (UHE) cosmic rays, with energies above 10^{17} eV, can provide us key information on the most extreme processes in the Universe. When reaching the Earth, UHE cosmic rays penetrate the atmosphere and interact with air molecules, inducing a cascade of secondary particles, a so-called extensive air shower (EAS). The electromagnetic part of this cascade is mainly responsible for the emission of a radio signal. The detection of this radio emission is a new challenge for next generation UHE particle experiments, such as GRAND, an envisioned observatory which will consist of 200,000 radio antennas deployed in sub arrays at different locations worldwide. These experiments will focus on very inclined air showers, to maximize the size of the radio footprint on the ground, hence the detection efficiency. The physics of these very inclined air showers has however not been thoroughly studied. In this work, we examine the electromagnetic content of air showers arriving to Earth with various inclinations, their energy contribution to radio emission and their spatial distribution. We use the detailed Monte Carlo simulation tools CORSIKA and CoREAS and analytical modeling from physical principles, and we find that very inclined air showers submitted to an intense geomagnetic field present characteristic features which could lead to clear signatures in the radio signal, and hence impact the detection and reconstruction strategies of GRAND.

Astrophysics Field

Not in the above

Day constraints

Auteur principal: GUELFAND, Marion (LPNHE)

Orateur: GUELFAND, Marion (LPNHE)

Classification de Session: Session 8