
Towards a full and realistic simulation framework for the Extreme Energy Events experiment

The network of Multi-gap Resistive Plate Chambers telescopes of the Extreme Energy Events experiment (EEE) was designed to study very high energy cosmic rays through detection of secondary cosmic muons in the hadronic shower. To better understand and predict the behavior of such events, a GEANT4-based simulation framework, that well reproduces the response of individual telescopes, was built.

Telescope geometry and surrounding materials are implemented in simulation and detector response was parametrized based upon the measured performance. Simulation framework validation was performed by compare data with simulation and showed a good agreement of angular distributions and other reconstructed quantities.

The EEE simulation framework prove to be a valuable tool to study the detector performance, and can be used to compare and correct the response of different telescope in the network in order to achieve the systematic precision necessary to study of small effects, such as the variations of the cosmic ray flux.

EEE simulation framework can be used to investigate new opportunities, such as the use of cosmic muons for building tomography using telescopes, extending the current scope of the EEE Collaboration.

This is the first step towards a full simulation framework that includes a realistic generation of secondary particles, now limited to muons, and propagation through the atmosphere of the shower produced by primary cosmic rays.

In future we plan to integrate in the framework CORSIKA event generator for a detailed simulation of extensive air showers initiated by high energy primaries.