

The upgrade of the Extreme Energy Events experiment

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The Extreme Energy Events experiment is the largest system in the world implemented completely with Multi-gap Resistive Plate Chambers (MRPC). Presently, it consists of a network of 57 muon telescopes, each made of 3 MRPC, located at high schools in Italy, devoted to the study of secondary cosmic rays. The stations, sometimes hundreds of kilometers apart, are synchronized at a few nanoseconds level via a GPS clock. The data collected during centrally coordinated runs are sent to INFN CNAF, where they are reconstructed and made available for analysis. Thanks to the online monitoring and data transmission, they operate as a single coordinated system spread over the whole Italian territory.

In 2017, the EEE collaboration started an important upgrade programme, aiming to extend the network with 20 additional stations, with the option to have 10 more in the future. This implies the construction, testing and commissioning of 60 chambers, for a total surface of about 100 m², comparable to the one of the Time-Of-Flight system of ALICE at LHC. Peculiarly, the EEE chambers are built by the students taking part in the project during dedicated internships at CERN; the students also take care of the daily operation and monitoring of the muon stations in their schools.

In this presentation, all the aspects related to this challenging endeavor will be covered, starting from the technological solutions chosen to build these state-of-the-art detectors, to the quality controls and the performance tests performed at CERN and on site.

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