## The Extreme Energy Events project

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Abstract. The Extreme Energy Events (EEE) project aims to study extended air showers from high energy cosmic rays and extreme energy events by detecting the muon component of the shower. To achieve this goal, a network of muon telescopes has been installed in high schools distributed all over Italy. The project has been conceived by Prof. A. Zichichi in order to rekindle the interest of young people in science and give them a first-hand experience of scientific research. To ensure their full involvement in all stages of the project, they participate in the construction of the muon detectors, setting up and commissioning of the telescopes, installation in the schools and the data-taking and analysis. The project is financed Italian Ministry for Education, by the Universities and Research (MUIR), the National Institute for Nuclear Physics (INFN) and the "Centro Studi e Ricerche e Museo Storico della Fisica Enrico Fermi"; CERN is also a partner in the project.

Each muon telescope consists of three large area  $(80 \ x \ 160 \ cm^2)$  Multigap Resistive Plate *Chambers (MRPCs). Each MRPC has 6 gas gaps* of 300 microns. This design is based on the 10 gap MRPCs used for the Time Of Flight (TOF) system of the ALICE experiment at LHC. *Ionizing particles produce avalanches inside the* gas volume, which induce signals on 24 pick-up strips. They are read out at both ends, thus allowing the hit position along the strip to be obtained from the time difference. The front end electronics is based on the ultrafast NINO amplifier and discriminator developed for the The readout is a VME based ALICE TOF. system, using high resolution TDCs and a GPS card for the absolute time stamp needed to correlate events from different stations.

The efficiency of the MRPCs is better than 95% and the time resolution ( $\sigma$ ) is 100 ps. The

position resolution is of the order of 1 cm; thus the muon direction is reconstructed with an angular resolution of  $0.3^{\circ}$  (RMS).

The MRPCs for the muon telescopes were built at CERN by high school pupils and teachers under the supervision of researchers from INFN, Italian Universities and the Centro Fermi. The construction was distributed over the years 2005-2009. At this moment 34 stations are operational or in various stages of being installed, equipped and commissioned. In addition there is a long list of high schools eager to join the project.

The stations that are fully operational and take data routinely have started looking for coincidences between schools. The first publication covers the results of the detection of extensive air showers by means of time coincidences between two telescopes in L'Aquila, 180 m apart.