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Abstract

The Pierre Auger Observatory, the world's largest experiment in the study of the highest-energy astroparticles, is being upgraded with new detector technologies to reduce its current systematic uncertainties and accurately determine the mass composition of ultra high energy cosmic rays. The Auger Muons and Infill for the Ground Array (AMIGA), apart of the recent low-energy extension of the observatory, has the ability to directly measure the muonic component of extensive air showers.

High Energy Cosmic Rays have long been seen as an unique opportunity to probe hadronic interaction physics at high energies. A recent analysis found that the shape of the lower tail of the muon number distribution is sensitive to the properties of multiparticle production in the first interaction of the air shower.

Taking advantage of the detection capabilities of AMIGA, E $\simeq 10^{17}$eV, air-shower phenomenology studies are being developed in order to test first interaction properties for proton-air events at center-of-mass energies reached by the Large Hadron Collider for different hadronic interaction models.