

# Measurements of the muon content of air showers and search for ultra-high energy neutrinos and photons at the Pierre Auger Observatory

*Tuesday 27 August 2013 17:00 (30 minutes)*

The Pierre Auger Observatory offers a unique window to study cosmic rays and particle physics at energies above 3 EeV (corresponding to a center-of-mass energy of 75 TeV in proton-proton collisions) inaccessible to accelerator experiments. We discuss the different methods of estimating the number of muons in showers recorded at the Surface Detector array, which is an observable sensitive to primary mass composition and to properties of the hadronic interactions in the shower. The muon content, derived from data with these methods, is presented and compared to predictions from the post-LHC hadronic interaction models. In the light of observed  $X_{\max}$  distribution being incompatible with an iron dominated composition, we conclude the observed number of muons is not well reproduced by the shower simulations. We also present the latest results on the search of UHE neutrinos and photons in the EeV range, reporting updated upper limits on the diffuse flux of ultra-high energy neutrinos and new upper limits on regularly emitting non-beamed photon sources in the Galaxy.

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**Session Classification:** Ultra-high-energy messengers