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High energy muon production in Cosmic Ray air showers

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Over the past decade, data from ground based cosmic ray air shower arrays such as Pierre Auger Observatory and Ice-Cube Neutrino Observatory have consistently revealed a deficit in the number of muons predicted by air shower simulations compared to observations, at more than 8 standard deviations in combined statistical significance, leading to the so called muon puzzle. Resolving this puzzle remains a key challenge for accurate measurement of cosmic ray mass composition for indirect detection experiments, as well as for neutrino astronomy. We present a systematic study of the uncertainties in atmospheric lepton flux predictions, from hadronic interaction models. The discrepancy starts at TeV energies and is thus tractable with data from the LHC. Prospects with forward hadron production data from pp, p-Pb, and p-O collisions at LHC will be discussed.

Session

Astroparticle Physics and Cosmology

Primary author: KARTHIK, Mohan

Presenter: KARTHIK, Mohan

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