APR12-2012-000774

Abstract for an Invited Paper
for the APR12 Meeting of
the American Physical Society

Cosmic Ray Muons in QCD

LISA GERHARDT, Lawrence Berkeley National Laboratory

Despite 100 years of effort, many aspects of cosmic rays are still not well understood. Studies of high-energy muons produced in cosmic ray air showers are an important part of this effort. These muons are produced by the decays of pions and kaons at lower energies, and by charm quarks above about 1 TeV. Measurement of these muons can be used to determine the composition of cosmic rays. Moreover, the muons are produced at far-forward rapidities and are an excellent complement to data collected by accelerators at lower rapidity. Underground detectors have studied cosmic ray muons and measured lateral separations ranging from the meter scale to hundreds of meters. For larger separations, the muon transverse momentum is in excess of 6 GeV/c and muon interactions can be characterized using perturbative QCD. These measurements can be used to extend accelerator measurements to higher center of mass energies and rapidities, and have important implications for charm production as well as cosmic ray composition.