APR12-2012-000983

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

Hadronic Physics and Air Shower Detectors

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The Earth is continuously hit by cosmic particles of very high energy. When entering the Earth's atmosphere, these particles interact hadronically with nuclei in air and produce gigantic cascades of secondary particles. The cascades, called extensive air showers, contain up to several 100 billion particles reaching the ground at almost the same time. Operating many particle detectors in coincidence that are distributed over a large area, these air showers can be detected and moreover their features can be studied. Not only the energy, direction and most probable mass of the primary cosmic particle can be estimated but also conclusions on the characteristics of hadronic interactions in the early stages of the cascades can be drawn. Air shower based studies of hadronic multiparticle production are complementary to those carried out at accelerators, extending the reach in energy well beyond that of man-made accelerators. After giving a brief introduction to the physics of extensive air showers an overview of current shower detectors and their data will be given. Recent results on properties of hadronic interactions at different energies will be discussed, emphasizing the relation between cosmic ray and accelerator data.