

The composition of UHE cosmic ray primaries

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Abstract. Project GRAND is an array of proportional wire chambers. Each of the 64 stations has 8 planes of proportional wire chambers with a 50 mm steel plate above the bottom two planes. This arrangement allows a measurement of the angles and identity of each secondary track which reaches a detector station. In an extensive air shower it is possible to obtain the average heights from which the muons originate by extrapolating the identified muon track angles backward (upward). In an extensive air shower initiated by hadronic primaries, the top part of the shower is mesonic whereas the subsequent shower is essentially all electromagnetic. Since the muons come primarily from the mesonic component, their height-of-origin is within the upper portion

of the shower. This height is sensitive to the identity of the primary which initiated it since, e.g., an iron nucleus (with a high cross section) would tend to interact higher in the atmosphere than a proton (with a lower cross section). The sensitivity of this height-of-muon is better than methods which are sensitive to the position of the maximum number of charged tracks since this maximum position is within the lower, electromagnetic part of the shower. The mean height-of-muons is measured as a function of the number of detected tracks which is a measure of the energy of the shower.

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