COMPARISON OF SIMULATION RESULTS WITH SEA-LEVEL EXPERIMENTAL DATA ON 10^{14} - 10^{16} eV AIR SHOWER CORES

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ABSTRACT

Simulation predictions for the Leeds 35 m^2 horizontal discharge chamber array for proton primaries with a $\sim E^{-2.7}$ spectrum extrapolated from balloon data to 10^{16} eV give power law $\rho(r)$-spectra with constant slope ~ -2 consistent with the experimental data up to the point at which they steepen but overshooting them at higher densities, and at high shower sizes predicted cores which are significantly steeper than those observed. Further comparisons with results for heavy nuclei primaries (up to A = 56) point to the inadequacy of changes in primary composition to account for the observed density spectra and 'core flattening', and the shower size spectrum together, and point, therefore, to the failure of the scaling interaction model at $\sim 10^{15}$ eV primary energy.