

THE LATERAL DISTRIBUTION OF CHERENKOV LIGHT IN 10 TEV PRIMARY PROTON SHOWERS

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The detection of EAS Cherenkov light is widely exploited at TeV energies for gamma ray astronomy applications. However, the interpretation of this light is essentially based on simulations, mainly due to the difficulty of having a simultaneous measurement of the associated EAS. As a first step in the analysis of the complete shower, a measurement of the total shower intensity and of the lateral distribution of Cherenkov light has been performed at the Gran Sasso laboratories by the EAS-TOP and MACRO arrays. The seven-telescope EAS-TOP array (each with two light collectors 80 cm in diameter) has been used as a Cherenkov detector. The muon tracking system of MACRO in the deep underground Gran Sasso laboratories ($E_\mu > 1.3\text{TeV}$) served as the EAS detector. The MACRO data measure the EAS core geometry with an accuracy < 1 degree in the arrival direction, and < 20 m in core location. MACRO data also select a sample of primaries with energy $E_o > 1.3$ TeV/nucleon, primaries thus dominated by protons. Measurements are compared with the results of simulations based on the CORSIKA-QGSJET code.