# Particle density fluctuations and correlations in low energy Cosmic-Ray showers simulated with CORSIKA

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## Executive Summary

In this work we studied Extensive Air Showers simulated with CORSIKA, the program commonly used for air shower simulations. Obtained data included 18 sets of cascades in a wide energy range of the primary particle (proton), from 1 TeV up to 4 000 TeV. The main objective of the analysis was to observe the fluctuations in particle density, separately for EM particles (electrons, positrons and gammas) and for muons. In the proposed method each cascade was divided into rings with a specific width and the particle density was calculated for each ring as well as in the neighborhood of each particle. Datailed analysis reveals that near a selected particle the density of other particles is enhanced. The formation of clusters is easily noticeable for muons and strong for electrons and gammas. Obtained results are useful in further analysis, for example to obtain probability of detection of an Extensive Air Shower without precise simulations.