New insights from old cosmic rays: A novel analysis of archival KASCADE data

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What is this contribution about?

We present a novel mass composition analysis based on archival data of the KASCADE air shower experiment acquired from 1998 to 2013 and provided by the KASCADE Cosmic ray Data Center (KCDC) [1].

Why is it relevant / interesting?

Cosmic ray data collected by KASCADE are competitive in terms of quality and statistics with those of modern observatories. We reanalyze the archival data to extract mass-dependent cosmic-ray spectra in the PeV energy domain.

What have we done?

We provide a novel analysis of the archival data based on modern machine learning techniques trained on simulation data provided by KCDC. The analysis uses recent hadronic interaction models EPOS-LHC, QGSJet-II and Sibyll 2.3c.

What is the result?

We present spectra for individual groups of primary nuclei, the results of a search for anisotropies in the event arrival directions taking mass composition into account, and search for γ-ray candidates in the PeV energy domain.

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[1] `https://kcdc.iap.kit.edu/datashop/fulldata/`