KMI Colloquium

LHC and Cosmic Rays: the Chicken or Eggs?

Tanguy Pierog
(Karlsruhe Institute of Technology)

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Abstract: In recent years the interpretation of high energy cosmic ray measurements took another direction. From the astrophysical point of view, it was usually admitted that extra-galactic charged cosmic rays were protons, but mass composition results for the Pierre Auger Observatory, in particular using hadronic interaction models updated with LHC data, show that a mixed composition is observed at energies well above the ankle of the spectrum. Realistic air shower simulation and hadronic interaction models are the key points for a proper interpretation of charged cosmic ray data and data measured at the LHC are a fundamental ingredient for these models. On the other hand, hadronic models used for cosmic ray analysis have a better predictive power than traditional high energy physics monte-carlo for minimum bias analysis at the LHC. After a first part dedicated to the post-LHC hadronic interaction models and their comparison to LHC data, the latest results from Pierre Auger Observatory will be presented with a focus given on mass composition and constrains on hadronic interactions ... leading to better models to describe LHC data.