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The multi-sources M. C. collision generator GHOST for C R simulations at LHC energies

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GHOST (1) is an extension of HDPM (Hybrid dual parton model) originally implemented in CORSIKA(2). It reproduces the pseudo-rapidity charged distribution for NSD events measured by LHCb, CMS and TOTEM up to $\sqrt{s} = 8\text{TeV}$. At this energy, two pairs of normal generators are centered symmetrically, respectively at small rapidity 1.05 and mid rapidity 4.1, with respective widths 0.95 and 1.8 units of rapidity. Together with NSD and inelastic components, we detail the diffractive component (single and double). A more important rise of central rapidity density suggests also an enhancement of the total multiplicity.

The semi-inclusive data is used to evaluate the consequences of the violation of the KNO scaling. The fluctuations of multiplicity are governed by the Negative binomial distribution and the opportunity of an asymptotic form of the energy dependent functions introduced by UA5 is investigated at UHE.; the results in limited pseudo rapidity intervals are used to evaluate a partial scaling, adjust the parameters of GHOST and describe the semi-inclusive pseudo rapidity distributions expected on a large range of rapidity. The validity of the relation between transverse momentum P_t and multiplicity at very high energy is also considered.

Those improvements have consequences in the simulation of EAS suggesting a maximum depth at higher altitude and a muon content more important than with previous models at least for $E_o \geq 2 \cdot 10^{16}$ eV. Comparisons are performed in addition with unexpected signals observed in EAS and in Gamma ray families in the energy range $\sqrt{s} = 2-14$ TeV (up to 10^{17} eV for EAS).

(1) Proceedings ISVHECRI CERN 2014 (to be published in EPJ)

(2) The simulation program CORSIKA, J.Knapp, D.Heck J.N. Capdevielle, G. Schatz, T.Thouw,

Collaboration

- not specified -

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