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Intermittency and fractality in pp collisions at s = 7 TeV classified by the number of partonic interactions

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High-multiplicity proton–proton collisions at the LHC exhibit collective signatures traditionally associated with quark–gluon plasma formation. To assess whether these signatures require a thermal medium, we analyze the fractal structure of phase space in pp collisions at $\sqrt{s} = 7$ TeV simulated with PYTHIA 8.3, an event generator without hydrodynamics.

We use scaled factorial moments with the cumulant variable, classifying events by the number of multiple parton interactions rather than by multiplicity, which avoids the bias introduced when events are selected from the same phase-space region where the observable is measured.

The behaviour of the intermittency index as a function of the number of multiple parton interactions is discussed, together with the critical exponent of the Ginzburg–Landau formalism. A distinctive feature emerging in the class of a single partonic interaction is also presented.

Keywords: intermittency; scaled factorial moments; multiple parton interactions; Ginzburg–Landau; PYTHIA.

Academic position of the presenting author

MSc. Student

Primary authors: PARDO RUIZ, Brayan Stiven (Estudiante); CUAUTLE, Eleazar (Instituto de Ciencias Nucleares, UNAM)

Presenter: PARDO RUIZ, Brayan Stiven (Estudiante)

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