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Fractal structure of Hadrons and multiparticle production

In 1979, Feynman and Veneziano had already proposed that multiparticle production can have a fractal structure, what could explain the complexity of the multiparticle processes in high energy collisions. In the next decades, multiparticle fractality was observed through the intermittence that appears in many distributions measured in different laboratories. Almost two decades before that, however, Hagedorn, Frautisch and Chew had already proposed that hadron structure presents a feature present in all fractals, namely, the self-similarity. From 2000 up to now, data from high energy collisions have evidenced that energy and momentum distributions present a long tail and deviates from the exponencial behaviour expected from Hagedorn's theory. More recently, it has been shown that a system with fractal structure must be described by Tsallis statistics, where the long tail is a natural result of power-law distributions obtained. In the present work, the fractal structure of hadrons is investigated. Fractal dimensions are calculated and compared with the results from intermittence analysis, systematic analyses of multiparticle production are presented, and other aspects of hadron fractality are investigated. Some possible consequences of this fractal structure in our understanding of non-perturbative QCD are explored.

Summary

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