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# Fluctuation effects in high-energy collisions

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## Abstract

One of the main characteristics of the high-energy hadronic or nuclear collisions is the existence of large event-by-event fluctuations, manifested in several observed quantities. ~~We investigated~~ <sup>The</sup> effects of fluctuations in the initial conditions, by using the *Interacting Gluon Model*, modified by the inclusion also of the impact-parameter fluctuation ~~[1]~~ <sup>is investigated</sup>. Some observables which follow directly from this model, such as the inelasticity and leading-particle distributions as well as the energy-dependence of the average inelasticity, exhibit a good agreement with all the existing data ~~including those obtained in cosmic-ray experiments, indicating the soundness of the model and showing the importance of correctly accounting for the impact-parameter fluctuation.~~ The rapidity and pseudo-rapidity distributions calculated by applying the one-dimensional hydrodynamical model with fluctuating mass and momentum show a considerable deviation from those computed with the average initial conditions, using the same mechanism. To account for the semi-inclusive distributions and the forward-backward correlation, it is necessary to take into account also the multiplicity fluctuation, for fireballs of fixed masses. This has been done within the longitudinal phase-space model, with the energy and momentum distributions of the fireballs given by the IGM.

- [1] S. Paiva, Y. Hama and T. Kodama, *Phys. Rev. C* **55** (1997) 1455.
- [2] Y. Hama and S. Paiva, *Phys. Rev. Lett.* **78** (1997) 3070.
- [3] Y. Hama, T. Kodama and S. Paiva, to appear in *Found. Phys.*

dedicated to Mikio Namiki's 70th birthday.