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# MC-EKRT event generator for initializing 3+1 D hydrodynamics

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We present a Monte-Carlo implementation of the EKRT initial-state model (MC-EKRT) [1]. Our new MC-EKRT event generator is based on collinearly factorized, dynamically fluctuating pQCD minijet production, supplemented with a saturation conjecture that controls the low-$p_T$ particle production. Previously, the EKRT model has been very successful in describing low-$p_T$ observables at mid-rapidity in heavy-ion collisions at RHIC and LHC energies [2,3]. As novel features, our new MC implementation gives a full 3-dimensional initial state event-by-event, and includes dynamical fluctuations in the saturation and particle production. As a proof of principle study, we average a large set of event-by-event MC-EKRT initial conditions and compute the rapidity and centrality dependence of the charged hadron multiplicities and elliptic flow for the LHC Pb+Pb collisions using 3+1 D viscous fluid dynamical evolution. In particular, we show that global energy conservation and spatial dependence of the nuclear PDFs are essential features to reach a good agreement with the measurements.

[1] M. Kuha, J. Auvinen, K. J. Eskola, H. Hirvonen, Y. Kanakubo, H. Niemi, in preparation
[2] H. Niemi, K. J. Eskola and R. Paatelainen, Phys. Rev. C 93, no.2, 024907 (2016)
[3] H. Hirvonen, K. J. Eskola and H. Niemi, Phys. Rev. C 106, no.4, 044913 (2022)

## Category

Theory

## Collaboration (if applicable)

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