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New Results On Energy and Momentum Conservation in Meson Production for A+A Collisions at SPS Energies

Monday, 11 June 2018 15:45 (0:20)

Collaboration

Abstract content

Our presentation will be based on our recent paper [1].
We construct a new, simple model of the heavy ion collision, local in the impact parameter plane, and appropriate for the SPS energy range. This model can be regarded as a new realization of the "fire-streak" approach, originally applied to studies of lower energy nucleus-nucleus reactions.
Starting from local energy and momentum conservation, we nicely describe the centrality dependence of the light meson rapidity distribution in Pb+Pb collisions at $\sqrt{s_{NN}} = 17.3$ GeV. In particular, we also explain the broadening of this distribution when going from central to peripheral collisions.
The results of our calculations are compared with SPS experimental data. We discuss the resulting implications on the role of energy and momentum conservation for the dynamics of meson production in heavy ion collisions.
A specific space-time picture emerges, where the longitudinal evolution of the system strongly depends on the position in the impact parameter (b_x, b_y) plane. In non-central collisions, we predict the existence of "streams" of excited matter moving very close to the spectator system in configuration (x, y, z) space.
This picture is consistent with our earlier findings on the longitudinal evolution of the system as deduced from electromagnetic effects on charged pion directed flow [2], and can provide an explanation for specific low-p_T phenomena seen in the fragmentation region of Pb+Pb collisions which we also address in this talk. We present our conclusions on the link between the initial stages of the A+A collision and the final state observables connected to strong and electromagnetic phenomena on charged meson emission.
References:
[1] A. Szczurek, M. Kielbowicz and A. Rybicki, Phys. Rev. C 95 (2017), 024908.
[2] A. Rybicki and A. Szczurek, Phys. Rev. C 87 (2013), 054909.

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