

# XIV Polish Workshop on Relativistic Heavy-Ion Collisions: Interplay between soft and hard probes of heavy-ion collisions



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## Electromagnetic effects on charged pion spectra at SPS energies

*Sunday, 7 April 2019 15:15 (15 minutes)*

One of the main goals of the NA61/SHINE experiment at the CERN SPS is to study properties of strongly interacting matter by a two-dimensional scan of elementary and nuclear reactions as a function of system size and collision energy. This talk presents new results on a new observable relevant for this part of the NA61/SHINE program, which is the modification of positively (negatively) charged particle spectra by the electromagnetic repulsion (attraction) of final state particles by the charged nuclear remnant, the spectator system.

Preliminary measurements of  $\pi^+/\pi^-$  ratios in central and intermediate Ar+Sc collisions at beam momentum of 150A GeV/c are shown, and compared to NA49 data in peripheral Pb+Pb collisions at 158A GeV/c as a function of longitudinal and transverse pion momentum. In spite of a dramatic decrease in the magnitude of spectator charge, spectator-induced electromagnetic effects remain clearly visible in Ar+Sc reactions. This is the first measurement of these effect in small nucleus-nucleus systems at the CERN SPS. The experimental data brings new information on the space-time evolution of the Ar+Sc system, and on the production of charged  $\pi$  mesons. A comparison of a dedicated electromagnetic Monte Carlo simulation to the new experimental data is included in the talk. This demonstrates that a stable spectator cannot describe the data, which requires the inclusion of both expansion and decrease in average rapidity of the effective charge cloud, made of spectator and partly also participant charge. Conclusions on the space-time evolution of pion production are presented.

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