

Strong and Electromagnetic Interactions at SPS Energies

Thursday 16 July 2009 14:45 (15 minutes)

Particle production in Pb-Pb collisions and hadron-induced reactions has been measured at a beam energy of 158 GeV per nucleon. The measurements provide full double differential coverage in a wide range of longitudinal and transverse momenta, including the central ("mid-rapidity") area and extending far into the projectile fragmentation region.

The resulting analysis shows the heavy-ion reaction as a mixture of different processes. On one hand, the transition from the elementary (proton-proton) to the nuclear (Pb-Pb) collision induces a visible modification of produced particle spectra. This effect is particularly important at higher transverse momenta.

On the other hand surprising phenomena, like the presence of large and strongly varying structures in the shape of the double differential cross section $d^2\sigma/dx_{Fdp}dT$, are induced by the final state electromagnetic interaction between produced particles and the charged spectator system. This effect is largest in peripheral collisions and at low transverse momenta, where it results in a deep valley in the x_F -dependence of the produced π^+/π^- ratio.

The basic characteristics of the electromagnetic phenomenon described above agree with those presented in an earlier theoretical work [1,2]. Versatile information on the heavy-ion reaction mechanism becomes therefore available. In particular, the electromagnetic effect is sensitive to the initial conditions of particle production (time of final state hadron emission, distance of the formation zone from the two spectator systems, size of the emission source). As a result, it provides new information on the space and time evolution of the particle production process.

[1] A.Rybicki, A.Szczurek, Phys.Rev.C75 (2007) 054903

[2] A.Szczurek, A.Rybicki, A.Gorski, J.Phys.G34 (2007) S827

Author: Dr RYBICKI, Andrzej (H.Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences)

Presenter: Dr RYBICKI, Andrzej (H.Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences)

Session Classification: IV. Heavy Ions

Track Classification: Heavy Ions