

Two identical pion and baryon-baryon correlations in collisions of Ni+Ni at 1.93A GeV

O. Czerwiakowa^(a), R. Kotte^(b), K. Piasecki^(a), T. Matulewicz^(a),

^(a) Institute of Experimental Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland

^(b) Institute of Radiation Physics, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

Two-particle correlations at small relative momenta provide information about the size of the emitting system due to their sensitivity to nuclear and Coulomb final-state interactions and quantum statistical effects. Small-angle correlations of pion-pion, proton-proton and deuteron-deuteron pairs emitted from Ni+Ni collisions at a beam energy of 1.93A GeV are investigated with the FOPI detector system at GSI Darmstadt [1]. Correlation functions have been obtained for different centrality classes and ranges of total kinetic energies, E_1+E_2 , of two coincident particles. A clear positive correlation is observed for small relative momenta of pion pair in the region of momentum difference $q_{\parallel} < 50$ MeV/c. An effective source radius can be obtained after fitting the Gaussian function to the Coulomb corrected correlation function. Proton-proton correlation function perfectly matches the results obtained in the previous FOPI studies [2]. The two-deuteron correlation function exhibits an anticorrelation effect for small relative momentum in the region of $q_{\parallel} < 100$ MeV/c. Experimental data were compared to a Koonin model [3] like final-state interaction model [4]. This allowed for the extraction of the effective Gaussian radius of the source of deuteron emission.

[1] W. Reisdorf et al., FOPI collaboration, Nucl. Phys. A 612 (1997) 493

[2] FOPI Collaboration (R. Kotte et al.), Z. Phys. A 359 (1997) 47

[3] S.E. Koonin, Phys. Lett. B 70, 43 (1977)

[4] FOPI Collaboration (R. Kotte et al.), Eur. Phys. J. A 6, (1999) 185