HADRON-HADRON CORRELATION AND INTERACTION FROM HEAVY-ION COLLISIONS

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We investigate the hadron-hadron interaction by using the intensity correlation in high-energy heavy-ion collisions. High-energy heavy-ion collisions are regarded as the hadron factory, where various hadrons are produced abundantly and simultaneously. The two-hadron intensity correlation is obtained as the convolution of the source function and the relative wave function squared, then it contains information of the hadron-hadron interaction. It is generally not easy to access the hadron-hadron interaction because of the weak decay contributions, which reduce the signal from the pairwise interaction. With the recent developments in identifying the weak decay vertex, however, now it becomes possible to reject secondary particles and to improve the purity of the pair.

The $\Lambda\Lambda$ interaction has been constrained by using the recently measured $\Lambda\Lambda$ correlation data. We find that increasing the pair purity is essential to extract information on $\Lambda\Lambda$ interaction. We next discuss the K^-p correlation. $\bar{K}N$ interaction is closely related to the nature of the $\Lambda(1405)$ resonance, and the K^-p correlation is found to show complementary information to the K^-p scattering. We also give a prediction of the $p\Omega$ correlation. The spin-2 $N\Omega$ state is one of the most promising candidates for resonant dibaryons, since the Pauli principle does not operate among quarks. The ratio of correlation functions between small and large collision systems is proposed to be a new measure to extract the strong $p\Omega$ interaction without much contamination from the Coulomb attraction.