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Baryon-(anti-)baryon interaction measurement with femtoscopy

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Interaction cross-sections for baryon pairs are of fundamental interest and they are actively investigated theoretically. They are known well for pairs of common (anti-)baryons, however there is a lack of precise data for heavier baryons, including the ones carrying strangeness. The two-particle correlation formalism (femtoscopy) is sensitive to the interaction kernel for a pair of particles, which is related to the pair interaction cross-section [1]. The formalism is extensively used to measure two-particle correlations in heavy-ion collisions. In particular the collisions at RHIC and LHC produce simultaneously large number of baryons and anti-baryons. We show how this formalism can be used to extract the cross-sections from the femtoscopic baryon-(anti-)baryon correlation functions [2]. The analysis is complicated by the presence of the so-called “residual correlations” arising from weak decay products in the measured sample. We show how this effect can be exploited to gain further insight into the cross-sections of even heavier baryons. We discuss the limitations of the measurement technique and estimate the discovery potential of currently available and soon-to-be-collected heavy-ion collision datasets at RHIC and at the LHC.

[1] A. Kisiel, H. Zbroszczyk, M. Szymanski; “Extracting baryon-antibaryon strong interaction potentials from $p\Lambda^-$ femtoscopic correlation functions”; Phys.Rev. C89 (2014) 5, 054916
[2] R. Lednicky, V.L. Lyuboshits; “Final State Interaction Effect on Pairing Correlations Between Particles with Small Relative Momenta”; Sov.J.Nucl.Phys. 35 (1982) 770, Yad.Fiz. 35 (1981) 1316-1330

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