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p-ϕ femtoscopic correlation analysis using a dynamical model

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Femtoscopic analysis using a two-particle correlation function has attracted significant interest as a method to study hadron interactions. According to the Koonin-Pratt formula [1, 2], the correlation function is interpreted as a convolution of the source function, which reflects the dynamics of the nuclear collisions, and the square of the relative wave function, which reflects the quantum statistical effect and the final state interaction between the pair of interest.

Recently, the ALICE collaboration measured the p-ϕ correlation function [3] in high-multiplicity p+p collisions, revealing a spin-averaged attractive interaction. In Ref. [4], the correlation function was analyzed on a spin channel-by-channel basis using the Gaussian source function. By adopting the lattice QCD potential for the ${}^4S_{3/2}$ channel [5], the strong attractive potential accommodating a bound state in the ${}^2S_{1/2}$ channel was extracted from the comparison with the experimental correlation function.

In this study, we analyze the p-ϕ correlation function in high-multiplicity p+p collisions at $\sqrt{s} = 13$ TeV using the source function from a state-of-the-art hydrodynamics-based model, DCCI2 [6], which can describe the entire process of collision reactions. We find a non-Gaussian long tail in the source function due to hadronic rescattering, leading to deviations in the resulting correlation function compared to that using the Gaussian source function. In addition, we reveal that the correlation function exhibits an intriguing behavior in the small relative momentum regions due to the collectivity of the generated matter. These results emphasize the importance of employing the source function that accurately reflects the collision dynamics for future high-precision studies of hadron interactions via femtoscopy. Finally, from the comparison with the experimental correlation function, we find that the present femtoscopic analysis using the DCCI2 source function also suggests the existence of a p-ϕ bound state in the ${}^2S_{1/2}$ channel, as in the case using the Gaussian source function.

[1] S. E. Koonin, Phys. Lett. B 70, 43 (1977).
[2] S. Pratt, Phys. Rev. D 33, 1314 (1986).
[3] ALICE Collaboration, Phys. Rev. Lett. 127, 172301 (2021).
[4] E. Chizzali et al., Phys. Lett. B 848, 138358 (2023).
[5] Y. Lyu et al., Phys. Rev. D 106, 074507 (2022).
[6] Y. Kanakubo, Y. Tachibana, and T. Hirano, Phys. Rev. C 105, 024905 (2022).

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