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Femtoscopy of the Origin of the Nucleon Mass

I will address the prospects of using femtoscopy in high-energy proton-proton and heavy-ion collisions to learn about the low-energy J/ψ-nucleon interaction. This interaction is relevant to the problem of the origin of nucleon's mass. Femtoscopy is a technique that makes it possible to obtain spatio-temporal information on particle production sources at the femtometer scale through measurements of two-hadron momentum correlation functions. These correlation functions also provide information on low-energy hadron-hadron forces as final-state effects. In particular, such correlation functions give access to the forward scattering amplitude. One can express the forward amplitude as the product of the J/ψ chromopolarizability and the nucleon's average chromoelectric gluon distribution; the latter accounts for most of the nucleon's mass. I will present the results of a recent study using the information on the J/ψ-nucleon interaction from lattice QCD simulations to compute J/ψ-nucleon correlation functions. The calculated correlation functions show evident sensitivity to the final-state interaction.

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Track Classification: Theory for strong QCD