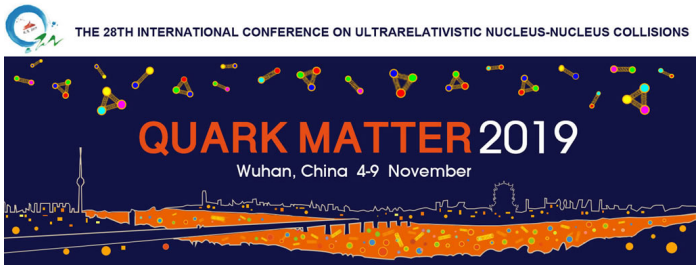

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First experimental test of HAL QCD lattice calculations for the multi strange hyperon - nucleon interaction with ALICE

Wednesday, 6 November 2019 11:00 (20 minutes)

A precise understanding of the Equation of State of dense objects like neutron stars is limited by the knowledge about the hyperon interaction and the precision of the models describing the latter. Traditionally, meson exchange models are used to describe the hyperon sector and are constrained by the scarce scattering and hypernuclei data, almost exclusively available for Λ hyperons. Recently the HAL-QCD collaboration conducted calculations without relying on constraints by data and with quarks and gluons as degrees of freedom. Their results converge for the interactions between heavier Ξ and Ω hyperons and nucleons and in the p-Ω system they predict a bound state.
Femtoscopy measurements in small systems make it possible to map the core of the potential at small distances and are currently the only viable way to provide a sensitive experimental measurement to test the lattice potentials. In this talk, we present the first precise study of the $p\Xi^-$ and $p\Omega^-$ interactions measured in pp collisions at 13 TeV with the ALICE detector. For the first time, clear signatures of the strong attractive interaction can be observed for these particles. The potentials provided by HAL-QCD calculations and meson-exchange are transformed so they can be compared to the measured correlation functions. For the $p\Xi^-$ interaction the HAL-QCD prediction is strongly favoured by the data with respect to the meson-exchange model. For the $p\Omega^-$ channel, strongly bound systems are excluded and the comparison between data and calculations leaves only room for binding energies below 1 MeV.

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