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Role of dibaryon resonances in elastic and inelastic NN scattering

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The recent results [1,2] of the dibaryon model for nucleon-nucleon (NN) interaction are presented. The model is based on a mechanism with the intermediate six-quark (dibaryon) state formation. Thus, the total Hamiltonian of the system has a two-channel matrix form where the external channel corresponds to the ordinary relative motion of two nucleons and the internal channel takes into account non-nucleonic degrees of freedom. Alternatively, one can solve the initial problem in the external channel only with the effective energy-dependent non-local interaction which arises after exclusion of the internal channel [2].
It is shown that in the particular NN channels, the model allows reproducing simultaneously the positions of the experimentally detected dibaryon resonances [3] and the partial scattering NN phase shifts up to energies far above the inelastic threshold [1,2]. By including a possibility of the decay of the intermediate dibaryon state, the inelasticity parameters for the discussed partial NN channels are reproduced as well. At the same time, one may consider some particular inelastic processes within the model, such as a near-threshold single pion production.
It is also discussed how to employ the above two-channel NN interaction in 3N system within the Faddeev framework. Here the Faddeev equations for the basic objects such as the total resolvent, the scattering wave function and transition operators for this type interaction are derived explicitly [2].

[1] V.I. Kukulin et al., Phys. Lett. B **801**, 135146 (2020); V.I. Kukulin et al., Phys. At. Nucl. **82**, 934 (2019).
[2] V.N. Pomerantsev et al., Few-Body Systems **60**, 48 (2019).
[3] P. Adlarson et al., Phys. Rev. Lett. **112**, 202301 (2014); V. Komarov et al., Phys. Rev. C **93**, 065206 (2016).

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