Baryon-Baryon Interactions $\{8\} \otimes \{8\}$ SU(3)-channels Nijmegen Extended-Soft-core ESC08c-model

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Kaon-production at FINUDA, JLAB, MAMI/FAIR and J-PARC opens great opportunities for studies in kaon-nucleon (KN) and baryon-baryon (BB) at low-, intermediate-, and high-energies. We report on the results obtained with the latest Nijmegen ESC-model ESC08c for the NN-, YN-, and YY-data, and the predictions for BB-channels with strangeness S=0,-1,-2,-3,-4. In the currently standard general physical framework: QCD and flavor SU(3), we discuss the interactions between hadrons from the perpectives of the constituent quark-model (CQM). Important theoretical topics we will discuss are: (i) properties of the Yukawian meson-exchange potentials, both one-boson-exchange (OBE), two-meson-exchange (TME), meson-pair-exchange (MPE), (ii) the connection between the meson coupling constants and F/(F+D)-ratio's based on flavor SU(3) and the CQM, (iii) multi-gluon-exchange, (iv) form-factors, (v) quark-core effects.

In ESC08c a simultaneous fit to the NN- and YN-scattering data, with a single set of meson parameters, excellent results are obtained. Moreover, the predictions are in full accordance with the experimental indications for $\Lambda\Lambda$ and ΞN. The achievements are: (i) For the selected 4233 pp and np data with energies $0 \leq T_{lab} \leq 350$ MeV, ESC08c reached a fit with $\chi^2/N_{data} = 1.08$. (ii) The deuteron binding energy and all NN scattering length are fitted very nicely. (iii) The YN-data are fitted very well $\chi^2/N_{data} = 1.07$, giving at the same time good descriptions of the Λ, Σ, and Ξ nuclear well-depths. (iv) The model predicts a bound state in $\Xi N(^3S_1, T = 1)$, i.e. a "strange-deuteron", with binding energies 1.56 MeV.

Special attention will be given to the three-body forces, derived from the meson-pair interactions contained in the ESC-models. These are applied to the triton binding-energy and the charge-symmetry breaking (CSB) in the A=4 Λ-hypernuclei. Also it is shown that the phenomenological inclusion of multi-gluon exchange in both few-body and many-body systems stabilizes nuclear, hyperonic, and neutron-star matter.