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Progress in the quest for a realistic three-nucleon force

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Despite long-lasting efforts in the determination of a realistic three-nucleon force (TNF), none of the presently available models leads to a satisfactory description of bound and scattering states of the $A = 3$ system. It seems natural to ascribe the above situation to the fact that these models include a very small number of adjustable parameters, compared to the two-nucleon interaction case. For example, in the framework of the chiral expansion, only 2 low-energy constants (LECs) enter up to and including N³LO. At the following order (N⁴LO) one encounters 10 additional LECs, which parametrize the short-range component of the TNF, and are unconstrained by chiral symmetry. As such, they could provide the necessary flexibility to arrive at a truly realistic model for the TNF. In this contribution we will report about our progress along these lines. In particular we examine to which extent the AV18 NN interaction, supplemented by the leading and subleading contact-range TNF, provides a satisfactory fit to $N - d$ scattering data.

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