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Two-nucleon scattering in effective field theory: searching for the power counting.

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In this talk I consider the two-nucleon system from the effective field theory viewpoint. In particular, I address the problem of constructing a sensible expansion of the scattering amplitude that is able to reconcile the requirements of (i) renormalizability, (ii) the existence of a well-defined power counting at the level of observable quantities and (iii) phenomenological success. Using the proposal of Nogga, Timmermans and van Kolck [1] as a starting point, I show how these conditions can be met by perturbatively renormalizing the chiral two pion exchange contributions to the nuclear force [2,3]. The explicit next-to-next-to-leading order computations show that the present scheme leads to a good description of the phase shifts, comparable with the results obtained in the Weinberg counting at the same order [4,5], but free of the usual inconsistencies generated by the full iteration of chiral nuclear forces [6]. Further aspects of the theory, such as the convergence rate, the expansion parameter, or the power counting
in deuteron reactions, will be briefly discussed [7].

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