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How to Classify Three-Body Forces – and Why HARALD W. GRIESSHAMMER, The George Washington University —

To add 3-body forces when theory and data disagree is untenable when predictions are required. For the "pion-less" Effective Field Theory at momenta below the pion-mass, I provide a recipe to systematically estimate the typical size of 3-body forces in all partial waves and orders, including external currents [1]. It is based on the superficial degree of divergence of the 3-body diagrams which contain only two-body forces and the renormalisation-group argument that low-energy observables must be insensitive to details of short-distance dynamics. Naïve dimensional analysis must be amended as the asymptotic solution to the leading-order problem depends for large off-shell momenta crucially on the partial wave and spin-combination considered. The typical strength of most 3-body forces turns out weaker than expected, demoting many to high orders. As application, the cross section of $nd \to t\gamma$ at thermal neutron energies bears no new 3-body force [2], besides those fixed by the triton binding energy and nd scattering length in the triton channel. It is calculated as $[0.485(\mathrm{LO}) + 0.011(\mathrm{NLO}) + 0.007(\mathrm{NNLO})]$ mb $= [0.503 \pm 0.003]$ mb, converges and compares well with experiment, $[0.509 \pm 0.015]$ mb. In contradistinction, potential models list a spread of $[0.49 \ldots 0.66]$ mb, depending on the 2-nucleon potential and inclusion of the $\Delta(1232)$.

[1] H.W. Grießhammer: Nucl. Phys. **A760** (2005) 110 [2] H. Sadeghi, S. Bayegan and H.W. Grießhammer, in preparation.

Harald W. Griesshammer
The George Washington University

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