On the Convergence of Finite Range Expansions in 3-nucleon Systems JAMES SHEPARD, University of Colorado, Boulder, JAMES MCNEIL, Colorado School of Mines — We examine the convergence properties of the Effective Range Expansion based on Effective Theories (ET-ERE) of the 2-nucleon scattering amplitude in 3-nucleon applications in the context of a simple rank-1 separable 2-body potential where the finite range effects can be tracked explicitly. To illustrate the approach in a simple context we consider the bound and scattering properties of the $^3S_1$ and $^4S_{3/2}$ 2- and 3-nucleon systems. We find that the poor convergence of the 3-nucleon scattering amplitude using the ET-ERE can be traced to its poor account of finite range effects that soften the momentum dependence of the deuteron propagator in the Faddeev kernel. In contrast, a simple separable potential with dipole form factors works remarkably well and forms the leading term of a systematic controlled approximation expansion.

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