Exact Emulation of Few-Body Scattering at no Cost

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Abstract:

High-precision two- and three-nucleon interactions, derived phenomenologically or within chiral effective field theory (EFT), contain a priori unknown parameters that must be constrained by experimental data. This requires repeatedly solving scattering equations such as the Lippmann-Schwinger or Faddeev equation for many parameter values, which requires significant computational cost.

In this talk, we present a mathematically rigorous emulation framework for scattering observables. The emulator reproduces the results of high-fidelity scattering equation solvers at machine precision. Once constructed, it provides observables for arbitrary potential parameters at negligible computational cost. We demonstrate the performance of this approach for two- and three-body systems using realistic chiral EFT interactions.