Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Dimensional Crossover In Non-Relativistic Effective Field Theory II MURTAZA JAFRY, SILAS BEANE, University of Washington — Isotropic scattering in various spatial dimensions is considered for arbitrary finite- range potentials using non-relativistic effective field theory. With periodic boundary conditions, compactifications from a box to a plane and to a wire, and from a plane to a wire, are considered by matching S-matrix elements. The problem is greatly simplified by regulating the ultraviolet divergences using dimensional regularization with minimal subtraction. Gen- eral relations among (all) effective-range parameters in the various dimensions are derived, and the dependence of bound states on changing dimensionality are considered. Generally, it is found that compactification binds the two-body system, even if the uncompactified system is unbound. For instance, compactification from a box to a plane gives rise to a bound state with binding momentum given by $ln(\frac{1}{3}+5)$ in units of the inverse compactification 2 length. This binding momentum is universal in the sense that it does not depend on the two-body interaction in the box. When the two-body system in the box is at unitarity, the S- matrices of the compactified two-body system on the plane and on the wire are given exactly as universal functions of the compactification length.

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Date submitted: 06 Jan 2021 Electronic form version 1.4