



Contribution ID: 16

Type: **Talk**

Ab initio alpha-alpha scattering

Thursday, 2 July 2015 15:25 (15 minutes)

We present ab initio lattice calculations of alpha-alpha clusters scattering at next-to-next-to-leading order in chiral effective field theory using the adiabatic projection method. The adiabatic projection method is a general framework for scattering and reactions on the lattice which uses a set of initial cluster states and Euclidean time projection to give a systematically improvable description of the low-lying scattering cluster states. By imposing spherical wall boundary conditions, we extract scattering phase shifts directly from asymptotic cluster wave functions with less sensitivity to small stochastic and systematic errors than using finite-volume energy methods. We present lattice results for the alpha-alpha S-wave and D-wave scattering phase shifts at next-to-next-to-leading order in chiral effective field theory and compare with experimental data

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Session Classification: Parallel Session 5 - Few-Body Physics WG

Track Classification: Few-Body Physics Working Group