Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

Operator evolution for *ab initio* theory of light nuclei[1] MICAH SCHUSTER, San Diego State University, SOFIA QUAGLIONI, Lawrence Livermore National Laboratory, CALVIN JOHNSON, San Diego State University, ERIC JURGENSON, Lawrence Livermore National Laboratory, PETR NAVRÁTIL, TRIUMF — The past two decades have seen a revolution in *ab initio* calculations of nuclear properties. One key element has been the development of a rigorous effective interaction theory, applying unitary transformations to soften the nuclear Hamiltonian and hence accelerate the convergence as a function of the model space size. For consistency, however, one ought to apply the same transformation to other operators when calculating transitions and mean values from the eigenstates of the renormalized Hamiltonian. Working in a translationally invariant harmonic oscillator basis for the two- and three-nucleon systems, we evolve the Hamiltonian, square radius, and total dipole strength operators by the similarity renormalization group (SRG). The inclusion of up to three-body matrix elements in the ^{4}He nucleus all but completely restores the invariance of the expectation values under the transformation. We also consider a Gaussian operator with adjustable range; short ranges have the largest absolute renormalization when including two- and three-body induced terms, while at long ranges the induced three-body contribution takes on increased relative importance.

[1]This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344. IMRR: LLNL- ABS-647982

Micah Schuster
San Diego State Univ

Date submitted: 26 Jun 2014 Electronic form version 1.4