Abstract Submitted
for the HAW05 Meeting of
The American Physical Society

The structure of light nuclei with Interactions derived from Chiral Effective-Field Theory[1] ERICH ORMAND, V.G. GUEORGUIEV, PETR NAVRATIL, Lawrence Livermore National Laboratory, JAMES VARY, Iowa State University and Lawrence Livermore National Laboratory — It has been well established that high-quality, realistic nucleon-nucleon (NN) interactions based solely on NN scattering data fail to give an accurate description of the structure of light nuclei. Effective-field theories (EFT) based on chiral-perturbation theory provide a natural scheme to derive inter-nucleon interactions and predict a three-nucleon interaction at next-to-next-to-leading order (N^2LO). A key feature of these EFT potentials is a set of parameters; some of which are determined by the EFT NN couplings, while others are chosen to reproduce the binding energies of A=3 and 4 nuclei. In the past year, we have developed the requisite tools to utilize EFT-based potentials, including the NNN terms, in the ab initio no-core shell model (NCSM). We have also improved our shell-model codes to increase the scope of our calculations with three-nucleon interactions to the point where model spaces up to $6\hbar\Omega$ are now viable. We will show results of large-basis NCSM calculations for light p-shell nuclei and highlight the impact the N^2LO TNI and its parameters on their structure.

[1]This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48. Support from DOE grants SCW0498 and DE-FG02-87ER40371 is acknowledged.

Erich Ormand
Lawrence Livermore National Laboratory

Date submitted: 25 May 2005 Electronic form version 1.4