Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

Order-by-order predictions for nuclear and neutron matter[1]
FRANCESCA SAMMARRUCA, University of Idaho — We report on *ab initio* predictions of nuclear and neutron matter obtained within the BHF approach together with chiral forces. The parameters of the two- and many-body forces are constrained by the properties of the two- and the few-nucleon systems and not readjusted when such forces are applied in nuclear matter. Chiral effective field theories are based on a low-momentum expansion (ChPT) valid for momenta less than the chiral symmetry breaking scale, Λ. Therefore, nucleon-nucleon potentials based on ChPT are usually multiplied by a regulator function $f(p',p) = exp[-(p'/\Lambda)^{2n} - (p/\Lambda)^{2n}]$, where 0.5 GeV is a typical choice for the cutoff Λ. Together with power counting, ChPT allows for a systematic development of nuclear forces, where two- and many-body forces emerge on an equal footing at each order. The question we wish to explore is: how good is the rate of convergence of the chiral expansion? Better and better convergence with increasing order should be seen as improved cutoff independence. We will be concerned with the energy per particle in nuclear and neutron matter as well as the symmetry energy. The purpose is to determine the accuracy with which these quantities can be predicted in ChPT, order by order.

[1]Support from DOE is acknowledged.

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Date submitted: 18 Jun 2014 Electronic form version 1.4