Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

**Universal Correlations in “Pion-less” Effective Field Theory: 3, 4 and 6 Nucleons**

HARALD W. GRIESSHAMMER, JOHANNES KIRSCHER, DEEPSHIKHA SHUKLA, Center for Nuclear Studies, George Washington University, HARTMUT M. HOFMANN, University Erlangen-Nuernberg — In a feasibility study for chiral EFT and heavier systems, we analyse bound and scattering properties of 3-, 4- and 6-nucleon systems in the Effective Field Theory “without pions” at next-to-leading order using the Refined Renormalisation Group Method with full Coulomb treatment, with 3N-interactions, phase-equivalent potentials and a range of cut-offs for convergence checks. For correlations between the triton binding energy $B_{3H}$, its charge radius and the binding energy of $^4$He, convergence is consistent with an expansion parameter $\approx \frac{1}{3}$. No 4N-interaction is needed for renormalisation. With the correlation between $B_{3H}$ and the $^3$He binding energy iso-spin symmetric at NLO, the model-independent difference at the physical $B_{3H}$, [0.10 $\pm$ 0.03]MeV, is the same both in magnitude and uncertainty as estimates from charge-symmetry breaking. In the first scattering calculation for $A \geq 4$, we found a correlation between $B_{3H}$ and the real part of the singlet scattering length of $^3$He–n scattering similar to the Tjon line. Finally, we address convergence of “pion-less” EFT in the halo nucleus $^6$He.

1Supported in part by NSF CAREER-grant PHY-0645498 and DOE grant DE-FG02-95ER-40907.

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Date submitted: 22 Jun 2009

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