Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

Effective field theory for the Helium-6 halo nucleus[1] CHEN JI, CHARLOTTE ELSTER, DANIEL PHILLIPS, Ohio University — The ground-state of Helium-6 can be treated as a two-neutron halo with an alpha-particle core. This bound state is generated by the resonant nn and $n\alpha$ interactions. The latter is dominated by a shallow p-wave resonance, where both the scattering length and effective range appear at leading order [1]. Here we first study a separable-potential model which fits the nn and $n\alpha$ scattering parameters (c.f., e.g. [2]). This reproduces known properties of He-6 moderately well for a specific choice of interaction ranges. We then show that the He-6 binding energy diverges in the limit that the range of the $n\alpha$ and nn forces goes to zero. This indicates that within Halo EFT this three-body system needs an $nn\alpha$ contact interaction to be properly renormalized at leading order. We adjust the coefficient of this $nn\alpha$ force to reproduce the Helium-6 ground-state energy, and present its running as a function of the cutoff. The correlations amongst Helium-6 properties that result from this successful renormalization of the leading-order three-body problem in halo EFT with p-wave resonant interactions will be discussed.

[1] C. A. Bertulani, *et al.*, Nucl. Phys. **A712**, 37 (2002).
[2] A. Ghovanlou, D. R. Lehman, Phys. Rev. **C9**, 1730 (1974).

[1]Work supported by the US DOE (Office of Nuclear Physics, under contract No. DE-FG02-93ER40756 with Ohio University).

Chen Ji
Ohio University

Date submitted: 15 Jun 2011 Electronic form version 1.4