Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Non-resonant Density of States Enhancement at Low Energies for Three or Four Neutrons[1] MICHAEL HIGGINS, CHRIS GREENE, Purdue University, ALEJANDRO KIEVSKY, MICHELE VIVIANI, Instituto Nazionale di Fisica Nucleare — Low-energy scattering of the three neutron ($3n$) and four neutron ($4n$) systems are studied in the framework of the adiabatic hyperspherical method in the symmetries $J^\pi = 3/2^-$ and $J^\pi = 0^+$, respectively. The nucleon-nucleon (NN) interaction considered in this work is the phenomenological AV8' potential and the resultant hyperspherical potentials are compared to those computed with the AV18 potential and other NN potentials with and without a three-nucleon force. The lowest hyperspherical potential for each system exhibits no features that indicate the existence of a low-energy resonance. This non-resonant behavior is further substantiated through an analysis of the elastic phaseshift and density of states or Wigner-Smith time delay. However, there is an enhancement of the density of states at low energies due to a universal long-range attraction in the hyperradial potential which could help explain the enhanced 4n signal observed in the experiment by Kisamori et al. [1]. [1] K. Kisamori, et al. "Candidate Resonant Tetraneutron State Populated by the He-4 (He-8, Be-8) Reaction", Phys. Rev. Lett. 116, 052501 (2016).

[1]The work of MDH and CHG is supported in part by the NSF, Grant No.PHY-1912350, and in part by the Purdue Quantum Science and Engineering Institute. The research of AK and MV is supported by the INFN through the National Initiative "FBS".

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Date submitted: 23 Jun 2020 Electronic form version 1.4