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Cold Neutrons Confined in External Fields STEFANO GANDOLFI, JOE CARLSON, LANL, STEVEN C. PIEPER, ANL — Advances in computational techniques and facilities now allow us to calculate the properties of N=8 to 54 neutrons with realistic interactions confined in external fields. By examining the shell structure, spin orbit, and pairing properties of these systems we can provide input to constrain nuclear density functionals, particularly their properties in the extreme isospin limit where the density functionals are less constrained. These density functionals are used to study the properties of large neutron-rich nuclei, and often to try to predict the properties of the inner crust of neutron stars. We find that these systems are sensitive to the isovector gradient terms in the density functional, and also to the spin-orbit and pairing terms in the extreme isospin limit. We show results for the ground some excited state energies, rms radii, and mass distributions for these confined systems, and compare with some typical Skyrme parametrizations of the density functional. Modifications to the Skyrme parameters to better describe these pure neutron systems are also described.

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