Abstract Submitted
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Charge radii of exotic neon and magnesium isotopes[1] THOMAS PAPENBROCK, University of Tennessee, GAUTE HAGEN, GUSTAV R JANSEN, Oak Ridge National Laboratory, SAM J NOVARIO, Los Alamos National Laboratory — We compute the charge radii of even-mass neon and magnesium isotopes from neutron number N = 8 to the dripline. Our calculations are based on nucleon-nucleon and three-nucleon potentials from chiral effective field theory that include delta isobars. These potentials yield an accurate saturation point and symmetry energy of nuclear matter. We use the coupled-cluster method based on an axially symmetric reference state. Binding energies and two-neutron separation energies largely agree with data and the dripline in neon is accurate. The computed charge radii have an estimated uncertainty of about 2-3 percent and are accurate for many isotopes where data exist. Finer details such as isotope shifts, however, are not accurately reproduced. Chiral potentials correctly yield the subshell closure at N = 14 and also a decrease in charge radii at N = 8 (observed in neon and predicted for magnesium). They yield a continued increase of charge radii as neutrons are added beyond N = 14 yet underestimate the large increase at N = 20 in magnesium. Work available as [S. J. Novario, G. Hagen, G. R. Jansen, T. Papenbrock, Phys. Rev. C 102, 051303 (2020); arXiv:2007.06684].

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