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Neutron rich nuclei in heaven and earth BONNIE RUTEL, JORGE PIEKAREWICZ, Florida State University — An accurately calibrated relativistic parametrization is introduced to compute the ground state properties of finite nuclei, their linear response, and the structure of neutron stars. While similar in spirit to the successful NL3 parameter set, it produces an equation of state that is considerably softer—both for symmetric nuclear matter and for the symmetry energy. This softening appears to be required for an accurate description of various giant resonances of nuclei with different neutron-to-proton ratios. Among the central predictions of this model are a compression modulus for symmetric nuclear matter of $K = 230$ MeV and a neutron skin of ^{208}Pb of $R_n - R_p = 0.207$ fm. Further, the impact of such a softening of the equation of state on the properties of neutron stars is as follows: we obtain a limiting neutron star mass of $M_{\rm max} = 1.722\ M_\odot$ and a radius for a "canonical" $M_\star = 1.4\ M_\odot$ neutron star of $R_\star = 12.655$ km.

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