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## Determination of the neutron-deficient $^{54}\text{Ni}$ charge radius and symmetry energy constraints using the difference in mirror pair charge radii

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Different parameterizations of Skyrme energy density functionals show large variations in the stiffness of the neutron equation of state (EOS), making extrapolations to higher densities uncertain [bro00]. It has been shown that the difference in mirror pair charge radii is correlated with the L parameter, which is the slope of the symmetry energy in the nuclear EOS [bro17]. By placing constraints on L, the neutron equation of state can thereby be constrained. In the present study, the charge radius of neutron-deficient  $^{54}\text{Ni}$  was determined for the first time using collinear laser spectroscopy at the BEam COoling and LAser spectroscopy (BECOLA) facility [min13, ros14] at NSCL/MSU. Using the difference in mirror pair charge radii between  $^{54}\text{Ni}$  and  $^{54}\text{Fe}$ , a constraint of  $20 \leq L \leq 70$  MeV has been placed [pin21], consistent with results from the gravitational wave event of the GW170817 neutron star merger [rai19] and barely consistent with those from PREX-II [ree21]. Constraints on the neutron skin for  $^{48}\text{Ca}$  from this experiment are in agreement with the preliminary CREX results released at DNP 2021, implying a “soft” EOS and contradictory to the PREX results. In addition to the experimental results, a new trend analysis will be discussed, which evaluates the reliability of the difference in mirror charge radii as a good isovector indicator [rei22].

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**Primary author:** PINEDA, Skyy (Department of Chemistry, Michigan State University)

**Co-authors:** Dr KÖNIG, Kristian (TU Darmstadt); Dr ROSSI, Dominic (Institut für Kernphysik, Technischen Universität Darmstadt); Dr BROWN, B. Alex (Department of Physics and Astronomy, Michigan State University); Mr INVORVATI, Anthony (Department of Physics and Astronomy, Michigan State University); Mr LANTIS, J. D. (Department of Chemistry, Michigan State University); Dr MINAMISONO, K. (National Superconducting Cyclotron Laboratory, Michigan State University, Department of Physics and Astronomy, Michigan State University); Prof. NÖRTERSCHÄUSER, W. (Institute für Kernphysik, Technische Universität Darmstadt); Prof. PIEKAREWICZ, J. (Department of Physics, Florida State University, Tallahassee, Florida 32306, USA); Mr POWEL, R. C. (Department of Physics and Astronomy, Michigan State University); Mr SOMMER, F. (Institute für Kernphysik, Technische Universität Darmstadt)

**Presenter:** PINEDA, Skyy (Department of Chemistry, Michigan State University)

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