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Charge Radius of 32Si and Symmetry Energy in Nuclear EOS from Difference of Mirror Charge Radii 32Si- 32Ar

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The nuclear charge radius of 32Si was first determined [1] from the isotope-shift of hyperfine structure measured at the BECOLA facility at the Facility for Rare Isotope Beams, Michigan State University. A SiO+ molecular beam was produced in the batch mode ion source (BMIS), transported at 30 keV and broken up at BECOLA to produce Si+ for laser spectroscopy. The extracted charge radius provides ideal ground to benchmark ab initio calculations, and are compared to lattice and VS-IMSRG calculations as well as mean-field calculations.

The obtained charge radius of 32Si completes the radii of the mirror pair 32Ar - 32Si, whose difference is correlated [2] to and used to constrain the slope parameter ⌧ of the symmetry energy in the nuclear equation of state (EOS) [1]. The present result of the constraint on L is consistent with our previous measurements [3, 4], the lattice ab inito calculation and the analysis of gravitational wave form from the binary neutron star merger. However, it shows systematic shift from the PREX result. The details of experiment and results will be discussed.

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