

# Constraints on the Symmetry Energy Parameters from Proton Scattering Experiments at RCNP

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## Abstract

Electric dipole (E1) response of stable nuclei has been studied by proton inelastic scattering at very forward angles at the Cyclotron Facility of Research Center for Nuclear Physics, Osaka University by using high-resolution magnetic spectrometer Grand Raiden. The static electric dipole polarizability ( $\alpha_D$ ) has been determined precisely for  $^{208}\text{Pb}$ ,  $^{120}\text{Sn}$ , and  $^{48}\text{Ca}$  by using an inversely energy-weighted sum rule of the reduced E1 transition probability. The  $\alpha_D$  values of those nuclei are predicted by mean-field model calculations to be highly-correlated with the symmetry energy parameters of the nuclear equation of state. In general,  $\alpha_D$  is sensitive to the symmetry energy parameters below the saturation density. I will describe the experimental method and summarize the results. If the time allows, I will show a few recent extensions of the proton scattering works.