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# A new paradigm in the consistent extraction of nuclear symmetry energy and related properties using the relativistic application of coherent density fluctuation model

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Since the advent of nuclear physics, traditional bulk properties such as binding energy, shell correction, and deformations have facilitated the prediction of shell closure near the $\beta$-stability region. However, moving away from the stability region towards the dripline, the isospin-asymmetry (neutron-proton asymmetry) starts to dominate. For enhancing the understanding of this region, it is required the use an observable dependent on isospin-asymmetry. The nuclear symmetry energy is one such observable [1-2]. However, it comes with a caveat. Being a quantity associated with nuclear matter, it is usually defined in the momentum space, while finite nuclei are defined in the coordinate space. As a remedy, the coherent density fluctuation model (CDFM) was proposed to consistently translate symmetry energy and related nuclear matter quantities from momentum space to coordinate space [1-4]. Moreover, with the recent incorporation of relativistic energy density functional within the CDFM formalism, we have successfully addressed the Coester-Band problem that plagued Brückner's prescription [4]. In addition, a novel method has been suggested to compute the surface and volume terms of symmetry energy, yielding better constraint results. This facilitates a comprehensive exploration of the entire nuclear landscape while validating the established experimental shell closures and predicting novel shell closures. In the present work, we examine the presence of novel shell closure along various isotopic chains in medium mass regions, which helps cater to our current understanding of the variation of surface properties in the exotic regions of the nuclear chart.

**References:**

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