Nuclear Matter Properties of Deformed Neutron-Rich Exotic Nuclei

M.K. Gaidarov[1], **A.N. Antonov**[1], **P. Sarriguren**[2], **E. Moya de Guerra**[3]

[1]Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences, Sofia 1784, Bulgaria
[2]Instituto de Estructura de la Materia, IEM-CSIC, Serrano 123, E-28006 Madrid, Spain
[3]Departamento de Fisica Atomica, Molecular y Nuclear, Facultad de Ciencias Fisicas, Universidad Complutense de Madrid, E-28040 Madrid, Spain

The symmetry energy, the neutron pressure and the asymmetric compressibility of deformed neutron-rich even-even nuclei are calculated on the examples of Kr and Sm isotopes within the coherent density fluctuation model [1, 2] using the symmetry energy as a function of density within the Brueckner energy-density functional [3]. The correlation between the thickness of the neutron skin and the characteristics related with the density dependence of the nuclear symmetry energy is investigated for isotopic chains of these nuclei in the framework of the self-consistent Skyrme-Hartree-Fock plus BCS method [4–6]. Results for an extended chain of Pb isotopes are also presented. A remarkable difference is found in the trend followed by the different isotopic chains: the studied correlations reveal a smoother behavior in the Pb case than in the other cases. We also notice that the neutron skin thickness obtained for ^{208}Pb with SLy4 force is found to be in a good agreement with recent data. In addition to the interest that this study may have by itself as well as in combination with the previous calculations of Ref. [7], we give some numerical arguments in proof of the existence of kinks in Ni and Sn isotopic chains that are not present in the Pb chain.

References

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