

Symmetry and Wigner energy in nuclei

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The nuclear symmetry energy is an important component of the binding energy of a nucleus and its accurate determination is crucial for a reliable description of neutron-star properties. The extrapolation of the symmetry energy from finite nuclei, where it enters the von Weizsäcker (or liquid drop) mass formula, to infinite nuclear matter is delicate because of the existence of surface effects. There is now strong evidence for the necessity of including a surface-symmetry term in the liquid-drop mass formula and its inclusion affects the estimate of the symmetry energy in infinite nuclear matter. In addition, it is shown in this talk that the effects of bulk and surface symmetry energies are intertwined with that of the Wigner energy. The latter is associated with the additional binding energy of $N=Z$ nuclei for which an explanation based on symmetry arguments was offered by Wigner a long time ago. The Wigner effect seems to disappear with increasing nuclear mass number A but more nuclear mass measurements are needed to confirm this conjecture. Finally, a method is proposed to determine the Wigner energy from isobaric analogue states which should ultimately lead to a more reliable estimate of bulk and surface symmetry energies.