Isoscalar giant monopole resonances in ^{92,96,98,100}Mo and ^{90,92,94}Zr and the incompressibility coefficient of nuclear matter

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The centroid energies of the isoscalar and isovector resonances were calculated for multipoles up to L=3, within a spherical Hartree-Fock based Random Phase Approximation theory (HF-RPA), in ^{92,96,98,100}Mo and ^{90,92,94}Zr using 33 commonly employed Skyrme-type effective nucleon-nucleon interactions found in the literature [1].

Here we report on the study of the centroid energy of the Isoscalar Giant Monopole Resonance (ISGMR) as a function of the incompressibility of nuclear matter K_{NM}. As can be seen in Fig.1 although

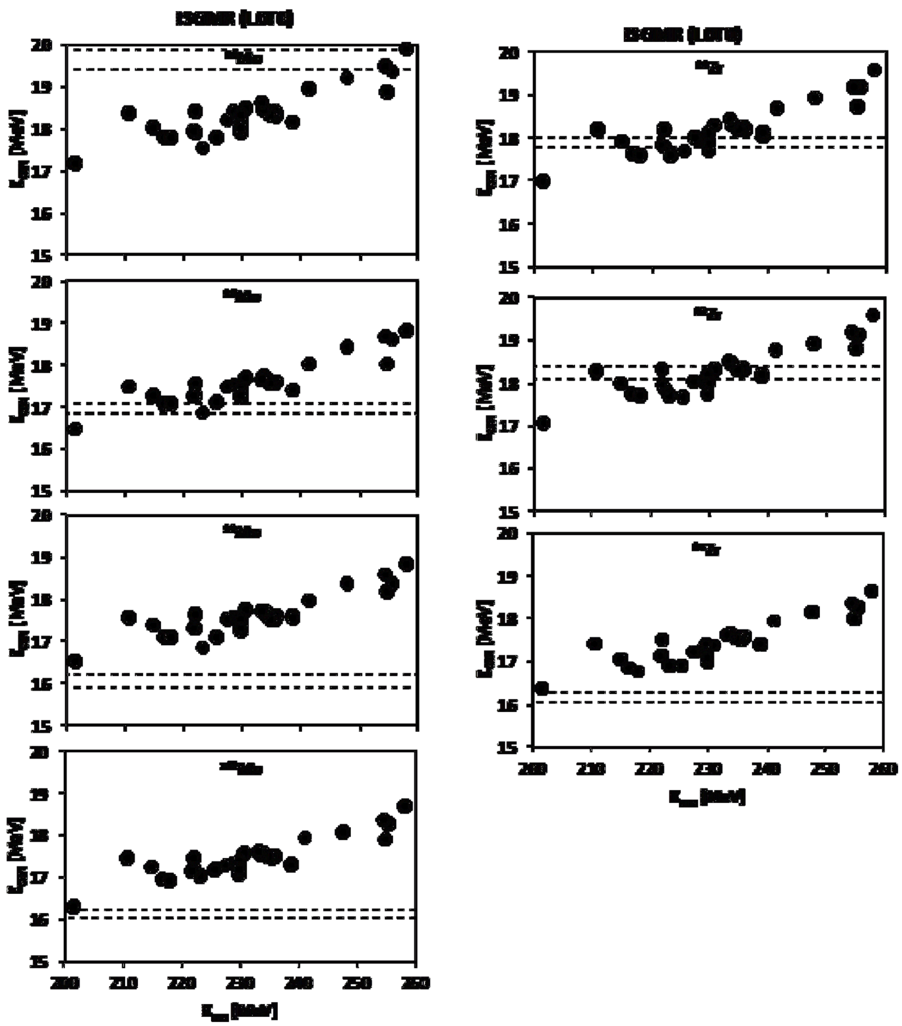

FIG. 1. Calculated Centroid Energies in MeV (full circle) of the low energy component of the Isoscalar Giant Monopole Resonance, for the 33 different Skyrme-type interactions, as a function of the incompressibility of nuclear matter K_{NM}. Each nucleus has its own panel and the experimental uncertainties are contained by the dotted lines. The Pearson correlation is strong with C~0.87 for all nuclei considered.

we see the usual dependence of the centroid energy on the Incompressibility (Pearson correlation coefficient is C ~ 0.87), we also find for the more neutron rich nuclei, namely ^{98,100}Mo and ^{94}Zr, that all the interactions considered here predict the centroid energy above the experimental value. Moreover for the strength distributions themselves, the theory predicts most of the strengths to fall in one symmetric peak, whereas the experimental data show a second peak at higher energy. This effect could be due to the larger deformation of the nucleus as we move farther away from the shell closure. We point out that the experimental analysis of the measured excitation cross sections was carried out using semi-classical transition densities which are independent of the excitation energy. Calculations of the excitation cross-sections with the use of energy-dependent transition densities, obtained from RPA calculations, are required to better understand this issue.

[1] G.Bonasera *et al*., (to be submitted).