# Isovector giant dipole resonances in $^{92,94,96,98,100}$Mo and $^{90,92,94}$Zr and the energy weighted sum rule enhancement coefficient

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We have performed fully self-consistent Hartree-Fock (HF)-based random phase approximation (RPA) calculations of the centroid energies for the isovector resonances up to L=3 multi-polarity for the isotopes of $^{92,94,96,98,100}$Mo and $^{90,92,94}$Zr. The calculations were done using 33 different Skyrme-type effective nucleon-nucleon interaction commonly adopted in the literature. The interactions considered cover a wide range of values of nuclear matter properties. We use the occupation number approximation for the single particle orbits of the open shell nuclei to carry out spherical HF and RPA calculations.

The Pearson linear correlation coefficient is calculated for every nuclear matter (NM) property. We then compare our theoretical calculation to the available experimental data and in the cases where we have high correlation we can set limiting values on the NM properties. Here we report on a strong correlation between the centroid energies, $E_{CEN}$, of the isovector giant dipole resonances (ISGDR) and the energy weighted sum rule coefficient factor $\kappa$. In Fig. 1 we show that the centroid energies, of the isovector giant dipole resonance associated with each Skyrme interaction as a function of $\kappa$, have a strong Pearson linear correlation coefficient for all nuclei shown. Similar results were found for the isovector resonance with L= 2 and 3. With the available experimental data, we can limit the value of $\kappa$ to be between 0.25 and 0.65. Analysis was performed for all the resonances and nuclei [1] and other nuclear matter quantities.

These results, together with a similar analysis done for a wide mass range of spherical nuclei [2], will be used to set constrains on NM properties and determine the next generation nuclear energy density functional with improved predictive power for properties of nuclei and nuclear matter.

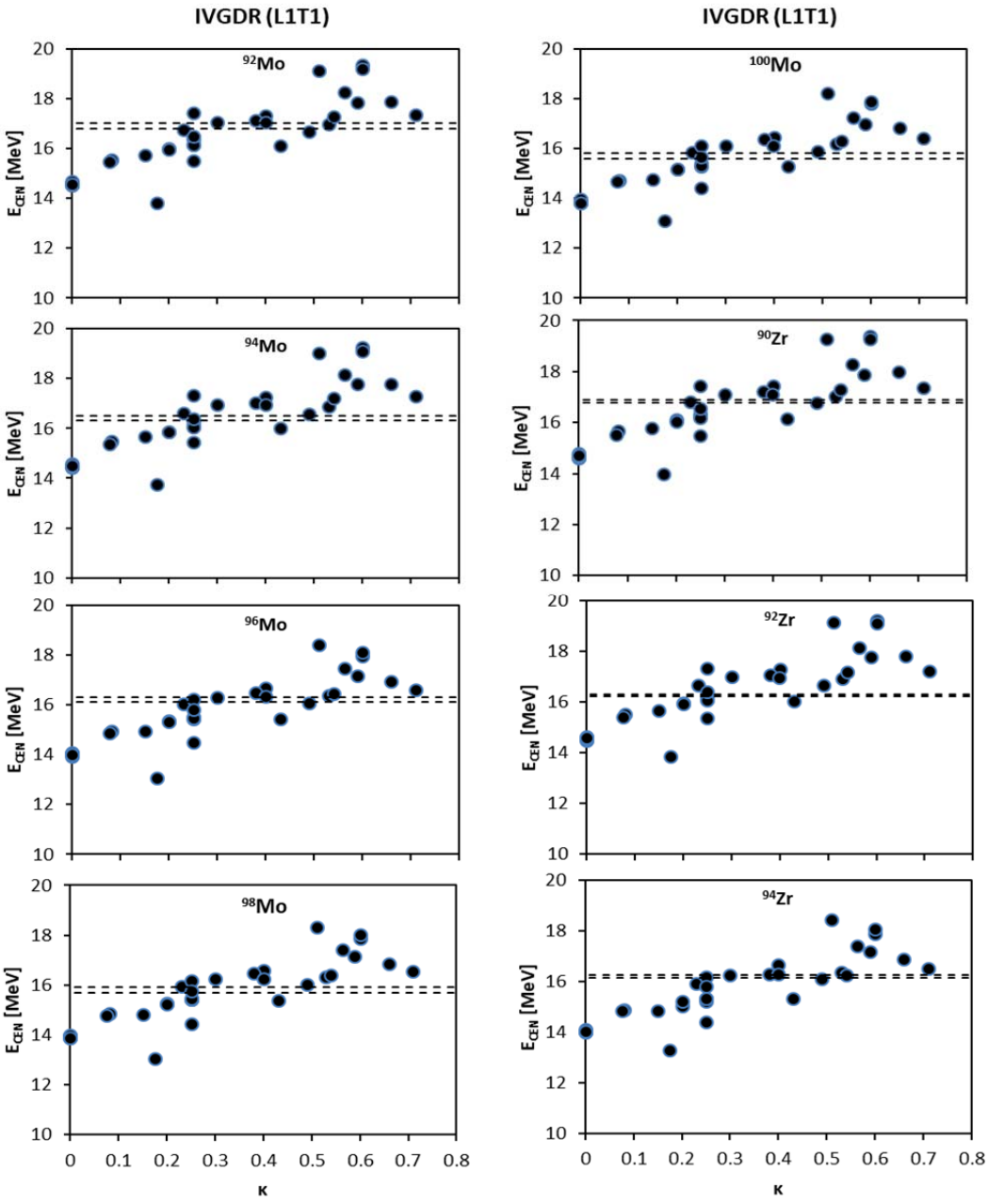


**FIG. 1**. Calculated centroid energies, $E_{CEN,}$ in MeV (full circle) of the isovector giant dipole resonance (ISGDR), for Skyrme interactions, as a function the isovector enhancement coefficient κ. Each nucleus has its own panel and the experimental uncertainties are contained by the dashed lines. We find strong correlation between this NM property and the calculated $E_{CEN}$ with a Pearson linear correlation coefficient C = .85 for all isotopes considered.

[1] G. Bonasera *et al*., in preparation for publication.

[2] G. Bonasera *et al*., in preparation for publication.