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What do we learn from our giant resonances experiment?

Nuclear matter incompressibility (KNM) is an important physical constant, unfortunately it cannot be measured directly. The location of the isoscalar giant monopole resonance (ISGMR) can be directly related to the incompressibility coefficient of nuclear matter (NM) by comparing experimental measurements of EGMR with energies calculated using specific microscopic interactions. This provides a unique relationship between EGMR and KNM.

Our program use the 240 MeV alpha beam from the Texas A&M University K500 superconducting cyclotron bombarding foils in the target chamber of the multipole-dipole-multipole (MDM) spectrometer. Inelastically scattered alpha particles are measured at small angles including 0o where the angular distributions of the isoscalar giant resonances show distinct features.

GMR strength, close to 100% of the energy weighted sum rule (EWSR), in many nuclei between 12C and 208Pb has been extracted and is generally consistent with KNM = 220 - 240 MeV. Studies in Sn and Cd isotopes have been used to set better constraints on parameters such as L and Kτ. of the symmetry energy.

In some nuclei, however, EGMR values (and hence KA) are not consistent with the general picture. These anomalies raise the issue of what is left out of the calculations relating KNM to KA values for specific nuclei, and what effect they might have in the overall extraction of KNM.

Primary author: Dr LUI, Yiu-Wing (Texas A&M university, Cyclotron Institute)

Presenter: Dr LUI, Yiu-Wing (Texas A&M university, Cyclotron Institute)

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