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Giant Monopole studies at iThemba LABS

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The Isoscalar Giant Monopole Resonance (ISGMR) is a collective nuclear excitation that was discovered nearly five decades ago. Our current comprehension of the ISGMR in stable nuclei relies heavily on experimental investigations conducted at the Texas A&M University (TAMU) Cyclotron Institute and the Research Center for Nuclear Physics (RCNP) over the past thirty years. These investigations involved small-angle (including 0°) inelastic α-particle scattering measurements at energies of 240 MeV and 386 MeV, respectively. Non-negligible differences in the monopole strength distributions are observed for some nuclei, e.g. 24Mg, the even-even isotopes of Ca, Zr and Mo, as well as for 208Pb. These differences could impact the extracted centroid energy assigned to the ISGMR, as well as the description of K-splitting in light nuclei such as 24Mg. In light of the potential impact on our understanding of nuclear incompressibility, inelastic α-particle scattering measurements were performed at 200 MeV at iThemba LABS to elucidate these differences. The agreement in the monopole strength distributions for particular data-sets imply that they should be prioritized for evaluating nuclear incompressibilities. At a minimum, it's crucial to recognize the structural differences in monopole strength distributions across all accessible data-sets before commenting on the value of, and potential trends in, the nuclear incompressibility.

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