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Are the Molybdenums Fluffy Too?

"*Why are the tin isotopes fluffy?*" has remained, for nearly a decade, a fundamental open problem in nuclear structure physics: models which reproduce the isoscalar giant monopole resonance (ISGMR) in the "standard" doubly-closed shell nuclei, ^{90}Zr, ^{208}Pb, overestimate, by as much as 1 MeV, the ISGMR energies of the open-shell tin and cadmium nuclei [1-4].

To further elucidate this question as also to examine *when* this "fluffiness" appears in moving away from the doubly-closed nucleus ^{90}Zr, and *how* this effect develops, we have carried out measurements of the isoscalar giant resonance strength distributions in a series of molybdenum nuclei. The measurements were performed for ^{94,96,97,98,100}Mo, using inelastic scattering of 100 MeV/u α particles at the Research Center for Nuclear Physics, Osaka University. The targets, with thicknesses $\sim$ 5 mg/cm^2, were enriched to an isotopic purity of approximately 95%. The measurements on all nuclei were performed within the same experiment so as to minimize any systematic effects in the final results. The versatile, high-precision mass spectrometer, Grand Raiden, provided small angle ($0 - 10^\circ$) spectra virtually free of all instrumental background. The resulting double-differential cross sections can be used to reliably extract ISGMR strength distributions using a multipole decomposition analysis; this procedure is currently in progress. The extracted ISGMR strengths will be presented. It is hoped that these results, in combination with previously published results for the ISGMR strength in ^{90,92}Zr and ^{92}Mo [5], will provide important information for possible refinements of theoretical models in describing this mode in open- and closed-shell nuclei alike.

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References:

[1] U. Garg, *et al.* Nucl. Phys. A, **788**, 36. (2007)
[2] J. Piekarewicz, J. Phys. G: Nucl. Part. Phys, **37**, 064038. (2010)
[3] L.G. Cao *et al.* Phys. Rev. C, **86**, 054313. (2012)
[4] P. Vesely *et al.* Phys. Rev. C, **86**, 024303. (2012)
[5] Y.K. Gupta *et al.* Phys. Lett. B, **760**, 482. (2016)

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