Contribution ID: **144** Type: **Oral**

Damping of the ISGMR in 90Zr and 120Sn

Friday, 24 September 2021 12:00 (20 minutes)

Giant Resonances (GRs) are considered to be high frequency shape-vibrations of the nucleus. Since the new millennium it became apparent that the IsoScalar Giant Quadrupole Resonance (ISGQR) exhibits fine structure that is independent of probe, and soon after that it was shown that other GRs also exhibit such fine structure. As such, this fine structure as an additional GR observable has been shown to be a useful tool to determine the damping mechanism of different shape-vibrations using the Wavelet Analysis technique.

The ISGMR was excited in ^{90}Zr and ^{120}Sn by using inelastic α-particle scattering measurements acquired with an $E_\alpha = 200$ MeV beam at $\theta_{\text{Lab}} = 0^0$ and 4^0. The high energy-resolution K600 magnetic spectrometer at iThemba LABS was used to detect the scattered alpha particles and an experimental energy-resolution of ~ 70 keV (FWHM) was achieved. This enabled the fine structure in the excitation energy region of the ISGMR to be investigated. Due to the limitations in angular acceptance and resolution, the $E0$ strength distributions in the present study was determined using the Difference-of-Spectra (DoS) method. Here, the $L = 0$ multipole excited (ISGMR $E0$ strength) has a maximum at $\theta_{\text{Lab}} = 0^0$ allowing the background from all other multipoles to be subtracted using an angle cut from the $\theta_{\text{Lab}} = 4^0$ measurements where the $L = 0$ has a deep minimum.

The aim of the work to be presented is to investigate the damping mechanism of the ISGMR in ^{90}Zr and ^{120}Sn. The $E0$ strength distribution in ^{90}Zr and ^{120}Sn will be discussed and compared to theoretical predictions from the Phonon-Phonon Coupling (PPC) model.

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Session Classification: Session 12

Track Classification: Nuclear Structure, Reactions and Dynamics