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Study of the Isovector Giant Dipole Resonance across the neodymium and samarium isotope chains from spherical to deformed nuclei using (p,p') scattering at 200 MeV

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Abstract content
   (Max 300 words)
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Fine structure in the energy region of the Isovector Giant Dipole Resonance (IVGDR) from spherical to deformed neodymium isotopes (^{142, 144, 146, 148, 150}Nd) has been observed in high energy-resolution proton inelastic scattering experiments for E_p = 200 MeV at zero degrees using the K600 magnetic spectrometer of iThemba LABS. This investigation is being extended to include the samarium isotope chain. The analysis of the (p,p′) scattering data on both the neodymium and samarium isotope chains will yield insight into the transition from spherical to deformed nuclei and provide information about the dominant damping mechanisms. For nuclei with 88 < N < 92, a detailed study of the IVGDR is of specific interest since this is the nuclear region in which a transition from spherical to permanently deformed nuclei occurs. As such, comparisons between ¹⁴⁸Nd and ¹⁵⁰Sm as well as between ¹⁵⁰Nd and ¹⁵²Sm, which are isotones in the transitional region, will provide further insight into the nature of the transition region itself and will allow for an investigation into the change in characteristic energy scales in the region where the onset of deformation is seen. Double differential cross-sections have been obtained for the neodymium isotope chain, paying particular attention to the reliability of the instrumental background subtraction. A comparison to photo-absorption data has been made and a preliminary wavelet analysis has been completed. These results will be presented, along with some theoretical aspects with respect to the comparison between neodymium and samarium isotopes.

Apply to be
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Yes

Level for award
 (Hons, MSc,
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PhD

Main supervisor (name and email)
and his / her institution

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Would you like to
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 Proceedings (Yes / No)?

No

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