

Giant resonances in nuclei and their wavelet analysis

Monday 23 June 2025 11:30 (30 minutes)

I present a brief review on multipole giant resonances (GR) in atomic nuclei. The origin, basic properties and present status of GR exploration are outlined. As an example, the wavelet analysis of GR fine structure, performed by collaboration of the experimentalists from iThemba Lab and theorists from BLTP JINR [1-5] is briefly described.

[1] L.M. Donaldson, C.A. Bertulani, J. Carter, V.O. Nesterenko, P. von Neumann-Cosel et al, "Deformation dependence of the isovector giant dipole resonance: The neodymium isotopic chain revisited", Phys. Lett. B **776**, 133 (2018).

[2] C.O. Kureba, Z. Buthelezi, J. Carter, G.R.J. Cooper, R.W. Fearick et al, "Wavelet signatures of K-splitting of the Isoscalar Giant Quadrupole Resonance in deformed nuclei from high-resolution (p, p') scattering off $^{146,148,150}\text{Nd}$ ", Phys. Lett. B **779**, 269 (2018).

[3] L.M. Donaldson, J. Carter, P. von Neumann-Cosel, V.O. Nesterenko, R. Neveling et al, "Fine Structure of the Isovector Giant Dipole Resonance in $^{142-150}\text{Nd}$ and ^{152}Sm ", Phys. Rev. C **102**, 064327 (2020).

[4] P. Adsley, V.O. Nesterenko, M. Kimura, L.M. Donaldson, R. Neveling et al "Isoscalar monopole and dipole transitions in ^{24}Mg , ^{26}Mg and ^{28}Si ", Phys. Rev. C **103**, 044315 (2021).

[5] A. Bahini, V.O. Nesterenko, I.T. Usman, P. von Neumann-Cosel, R. Neveling et al, "Isoscalar giant monopole resonance in ^{24}Mg and ^{28}Si : effect of coupling between the isoscalar monopole and quadrupole strength", Phys. Rev. C **105**, 024311 (2022).

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Session Classification: Monday