

# FINE STRUCTURE OF THE ISOSCALAR GIANT QUADRUPOLE RESONANCE AND FRAGMENTATION OF $E2$ STRENGTHS IN $^{28}\text{Si}$ AND $^{27}\text{Al}$

---

Iyabo. T. Usman, University of the Witwatersrand, Johannesburg, South Africa

---

I. T. Usman<sup>1</sup>, J. Carter<sup>1</sup>, R. Neveling<sup>2</sup>, F.D. Smit<sup>2</sup>, P. von Neumann-Cosel<sup>3</sup>, A. Richter<sup>3</sup>, H. Fujita<sup>5</sup>, G.R.J. Cooper<sup>4</sup>, R. Roth<sup>3</sup>, P.Papakonstatinou<sup>3</sup>, E. Sideras-Haddas<sup>1</sup>, J. Wambach<sup>3</sup>, E. Buthelezi<sup>2</sup> and S.V. Fortsch<sup>2</sup>

1 School of Physics, University of the Witwatersrand, Johannesburg 2050, South Africa

2 iThemba LABS PO Box 722, Somerset West 7129, South Africa

3 Institut für Kernphysik, Technische Universität Darmstadt, D-64289, Darmstadt, Germany

4 School of Earth Sciences, University of the Witwatersrand, Johannesburg 2050, South Africa

5. RCNP, Osaka, Japan

The Isoscalar Giant Quadrupole Resonance (ISGQR) in  $^{28}\text{Si}$  and  $^{27}\text{Al}$  nuclei have been investigated in high energy-resolution experiments using proton inelastic scattering at  $E_p = 200$  MeV with the state-of-the-art K600 magnetic spectrometer facility of iThemba LABS, South Africa.  $^{28}\text{Si}$  and  $^{27}\text{Al}$  nuclei were studied by measuring excitation energy spectra in the region of the ISGQR at scattering angle  $\theta_{\text{Lab}} = 12^\circ$  which is the maximum of the ISGQR, as well as  $\theta_{\text{Lab}} = 17^\circ$  for  $^{27}\text{Al}$ . The measured data are compared with Random Phase Approximation (RPA) and Second Random Phase Approximation (SRPA) calculations for  $^{28}\text{Si}$ . In order to do this, characteristic energy scales were extracted from both the experimental data and theoretical calculations using the relatively new application of Wavelet Analysis. Furthermore, quantitative analyses were carried out on  $^{28}\text{Si}$  data using the recently developed Semblance Analysis technique in order to extract information about the level of correlation that exists between the experimental data by using different probes in  $^{28}\text{Si}$  exciting ISGQR. Semblance analysis to compare the effect of one-proton-different nuclei was also applied to  $^{28}\text{Si}$  and  $^{27}\text{Al}$  experimental data. Acquired results will be discussed.