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Low-lying dipole strength in unstable nuclei

In the paper by D. Sarchi , PFB and G. Colò, (Phys. Lett. B601 (2004) 27), the dipole excitations (GDR and low-lying strengh) both in the known , stable isotopes like ^{208}Pb and ^{120}Sn as well as in the neutron-rich, unstable ^{132}Sn nucleus were calculated. The model of G.Colò and PFB (Nucl. Phys. A 696(2001) 427) is used, which includes pairing and anharmonicities (coupling with collective vibrations beyond QRPA). The results suggest that the model is reliable and predicts in all cases low-lying strength of NON COLLECTIVE nature. This is consistent with the general idea that the soft dipole strength, observed in halo light nuclei, should decrease in skin nuclei due to the coupling to the GDR (screening !), but at variance with the outcome of relativistic RPA studies (sse, e.g., D. Vretenar et al.,(2001) 496.)

In the following picture, produced by the GSI PhD student Adam Klimkiewicz , the comparison theory-experiment (P. Adrich et al., PRL 95 (2005) 132501) is shown in detail, for the low-energy part in ^{132}Sn.
From the experimental data, the GDR is subtracted, adopting a Lorentzian, and resulting in the green histogram with error bars. The low-energy part of the calculation,i.e. below 11 MeV, is shown by the dashed curve. The calculation was then folded with the detector response resulting in the blue curve.
The one-neutron separation threshold is at ~ 7.5 MeV, the LAND detector measures only above it.