Nature of the Pygmy Dipole Resonance

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In recent years investigations have been made to study the electric Pygmy Dipole Resonance (PDR) systematically, mainly in semi-magic nuclei. For this purpose the well understood high resolution (γ,γ') photon scattering method is used [1]. In complementary $(\alpha,\alpha'\gamma)$ coincidence experiments at $E_\alpha = 136$ MeV a similar energy resolution and a high selectivity to $E1$ transitions can be obtained at the Big-Bite Spectrometer (BBS) at KVI, Groningen. In comparison to the (γ,γ') method a structural splitting of the PDR could be observed in the N=82 nuclei ^{138}Ba and ^{140}Ce and in the Z=50 isotope ^{124}Sn [2,3,4]. There seems to be an energetically low-lying group of $J^\pi = 1^-$ states wich could be excited in the α-scattering experiments as well as in (γ,γ'). In addition, a high energy part is only observed in (γ,γ'). The experimental results and theoretical QPM and RQTBA calculations on ^{124}Sn will be presented. The low-lying group of $J^\pi = 1^-$ states seem to represent the more isoscalar neutron-skin oscillation of the PDR while the energetically higher-lying states seemingly belong to the tail of the isovector Giant Dipole Resonance (GDR).
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