GAMMA DECAY OF PYGMY STATES FROM INELASTIC SCATTERING OF IONS

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An overview of relevant results on the study of 1^- states focusing on their excitation with nuclear probes is here given. The main focus is the use of gamma decay from states populated via inelastic scattering, a technique employed for the study of stable and radioactive nuclei. The 1^- states are known to form the PDR (the pygmy dipole resonance) which is interesting for its connection in astrophysics for r-process and neutron stars. The neutron star connection relies on the stringent test of theory based on Energy Density Functional which predicts both isoscaler and isovector components for these states.

In order to pin down the two components (isoscaler and isovector) of the PDR states in ^{90}Zr, ^{124}Sn and ^{208}Pb experiments using the (^{17}O,^{17}O' γ) reaction were made employing AGATA as part of the detection system. Results are compared with available data obtained with the (γ, γ') reaction and with inelastic scattering (p,p') and (α, α'). These comparisons allow to learn on the nature of the populated states, whose isospin character is presently poorly known. The DWBA description of the data is discussed in terms of different form factors, standard collective form factor and form factors obtained by folding microscopically calculated transition densities. The main objective of the analyses is the extraction of the values of the fraction of the energy weighted sum rule strength. For completeness in all cases the DWBA analysis was made also for elastic scattering and excitations of 2^+ and 3^- states and possible evidence of pygmy states of quadrupole character was found for ^{124}Sn.