β DECAY AS NOVEL APPROACH TO LOW-ENERGY E1 EXCITATIONS

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Inspired by Total Absorption Gamma-ray Spectroscopy [1] following β decay, which exhibits an enhanced population of high-lying levels, a survey of available β-decay data was performed. The aim was to test, whether β decay can populate 1^- levels [2] associated with the Pygmy Dipole Resonance (PDR) [3]. The focus was set on high Q-value β-decays from mothers with low ground-state spin. Indeed for several nuclei a significant population of these 1^- levels was observed. The, in comparison to in-beam experiments, background free spectra obtained from β decay will allow for the extraction of complementary experimental data such as branching ratios to lower-lying excited states. Yet, for daughter nuclei where data about the 1^- levels exists from other probes, it is obvious that only a fraction of those 1^- levels is populated and the population pattern is significantly different. First exploratory calculations within the microscopic Quasiparticle Phonon Model [4] revealed that β decay populates only specific one-particle one-hole (1p1h) configurations but mostly two-particle two-hole configurations. This is in striking contrast to inelastic scattering experiments as, for example, (γ,γ') or (α,α'γ), which dominantly excite 1p1h configurations. Consequently, the well-established technique of γ-ray spectroscopy following β decay represents a novel approach to low-energy E1 excitations in nuclei. β decay is perfectly suited for neutron-rich radioactive nuclei, in which the PDR is supposed to be more pronounced.

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