

Search for the γ decay of the narrow near-threshold proton resonance in ^{11}B

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We present recent results on the γ decay of a peculiar near-threshold state in ^{11}B , expected to be located in the continuum just above the proton-decay threshold at 11.2 MeV. The relevance of such a state is due to the observation of the rare β -delayed proton emission process in the neutron-rich ^{11}Be nucleus, with an unexpectedly high rate, at odds with the narrow energy window available for this decay [1,2]. This phenomenon might be explained by the presence of a near-threshold proton resonance in ^{11}B , recently suggested by [3,4] in two different experiments using particle spectroscopy techniques. A step forward can be made by searching for the γ decay of this near-threshold proton state in ^{11}B , since the β -decay branch is extremely sensitive to the structure of the resonance wave function. According to the Shell-Model Embedded in the Continuum (SMEC) [5], the wave function of this narrow resonance is dominated by the $(^{10}\text{Be} \otimes \text{p})$ configuration, with a γ branch of the order of 10^{-3} compared to the main particle-decay mode. The experiment was performed at Laboratori Nazionali di Legnaro using the $^6\text{Li}(^6\text{Li}, \text{p})^{11}\text{B}$ fusion-evaporation reaction and the GALILEO-TRACE setup for the coincident detection of γ rays and charged particles [6,7]. For the first time, a limit on the γ -decay branch was established and implications for the description of ^{11}B as an open quantum system will be discussed.

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