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Looking for Beta-Delayed Protons in the Decay of 11Be

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Beta-delayed proton emission is a phenomenon that typically occurs for exotic neutron-deficient nuclei, when the proton binding energy in the beta-daughter nucleus is small and falls well within the Q-beta value. Nevertheless, the energy window for this process is open also for a few light, neutron-rich isotopes. Particularly interesting in this respect is the one-neutron halo nucleus 11Be, for which several channels for beta-delayed particle emission are open, including that for proton decay, with an energy window of 280 keV.
The beta-delayed proton branching ratio is interesting for the determination of the Gamow-Teller strength at high excitation energy and for testing models that predict a direct relation between delayed proton emission and the halo structure. Recent measurements yielded conflicting experimental results for the branching ratio value, triggering even further interest on the problem from the experimental and theoretical communities.

In this work, the Warsaw Optical Time Projection Chamber (OTPC) was used to search for beta-delayed protons in the decay of 11Be. The main experiment was performed at the HIE-ISOLDE facility in CERN, where post-accelerated 11Be ions were implanted into the OTPC and their subsequent decays with the emission of charged particles were recorded. In the talk, our experimental method will be described and the results presented.

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