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Searching for β-delayed protons from 11 Be

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11-Be is the neutron - rich nucleus expected to be a β-delayed proton emitter. The (very mall) branching ratio for this exotic decay mode (~ 10e−6) was obtained through indirect observations based on accelerator mass spectrometry [1, 2] and resulted to be about two orders of magnitude larger than predicted by theory [3]. The direct measurement of the delayed proton emission probability and energy spectrum is particulary challenging, given the small energy window available (~ 280 keV). The measurement of the βp energy spectrum is important for estimating the Gamow-Teller strength at high excitatiom energies and testing calculations that predict a direct relation between βp and halo structure. Moreover, recently, a new hypothesis, which may explain results of the AMS experiment, appeard. According to it, the neutron may have another decay channel in which unknown particles are produced in the final state [4, 5].
In August 2018 we performed the experiment IS629 at the HIE-ISOLDE facility, searching for β-delayed protons from 11-Be. We used the Warsaw Optical Time Projection Chamber (OTPC) [6]. The OTPC detector is well suited for detecting charged particles of low energy backgroung-free. The measurement was extremly challenging because of the combination of very low branching ratio (10e−8 ~ 10e−6), long half-life (T_1/2 = 13.7 s) and low energy of the protons. It required development of new solutions for the acquisition system and analysis software.
The descriptions of the experiment and the status of the data analysis will be presented.
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