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## Study of multi-neutron emission in the beta-decay of $^{11}\text{Li}$

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Beta-decay spectroscopy is one of the most useful tools for the study of nuclear structure. In exotic nuclei beta-decay is often followed by the emission of delayed particles, a process which becomes the dominant decay channel when approaching the driplines. In the most exotic species, the emission of two or more delayed particles can also occur with a significant probability.

Whereas the spectroscopy of two delayed proton emission has been explored in a number of cases, so far no such study has been performed for the emission of two delayed neutrons. We performed an experiment at CERN-ISOLDE to detect for the first time in coincidence two delayed neutrons following the decay of  $^{11}\text{Li}$  and measure their energies and angles, in order to investigate the sequential or direct character of the emission and the possible correlations between the neutrons. As  $^{11}\text{Li}$  offers one of the largest currently known two-neutron emission probabilities and can be produced with a sufficiently high yield, it was selected as the object of this first study. In addition, the experiment is expected to provide an improved picture of the very complex  $^{11}\text{Li}$  single neutron emission.

Detecting two neutrons in coincidence is particularly challenging. It requires the identification and rejection of random coincidences involving ambient gamma-rays and cosmic muons, as well as cross-talk events in which a single neutron fires two detectors. To overcome these issues, we used an array of liquid scintillator modules coupled to a digital electronics and signal processing system for the detection of neutrons. The use of a liquid scintillator allows to perform neutron-gamma discrimination to reject gamma-rays and muons, while the modular character of the array allows the application of kinematical cross-talk filters.

This talk will present the aim of the experiment and will focus on the selection of the two-neutron events.

### Selected session

Nuclear Structure and Dynamics

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