

Be-11 - case study

The study of β -delayed proton emission from exotic nuclei is a very important tool to investigate the structure of such nuclei. This method has been successfully used for studying neutron-deficient nuclei, specially those that lie close to proton drip-line. However, this phenomenon is expected to happen also for some neutron-rich nuclei following their β decay. One of these is Be-11.

To date, β -delayed proton emission from Be-11 was observed in indirect measurements based on accelerator mass spectrometry [1, 2]. These yielded the „rather large” branching ratio of $8.3(9)\cdot E-6$ for this decay mode (larger than expected by almost two orders of magnitude) [2]. β -delayed proton emission from Be-11 is characterised by the very small energy window available (~ 280 keV) and an expected proton energy spectrum peaking at about 180 keV. Such low energies have so far hindered the possibility of a direct observation of this decay mode.

An ideal tool to observe for the first time β -delayed protons emitted by Be-11 is the Optical Time Projection Chamber developed at the University of Warsaw, which is TPC with optical readout [3]. The challenges of such measurement (long half-life, ion diffusion in the TPC gas, possible ion drift in the electric field) required performing several ancillary measurements with radioactive beams. These studies were carried out in February 2018 at the ACCULINNA separator in FLNR, JINR. Preliminary results of this experiment will be presented.

[1] K. Riisager, Nucl. Phys. A 925, 112 (2014).

[2] K. Riisager et al., Phys. Lett. B 732, 305 (2014).

[3] M. Pomorski et al., Phys. Rev. C 90, 014311 (2014)

Primary authors: Dr MAZZOCCHI, Chiara (University of Warsaw); Prof. PFÜTZNER, Marek (University of Warsaw); Ms SOKOŁOWSKA, Natalia (University of Warsaw); Prof. DOMINIK, Wojciech (University of Warsaw); Prof. JANAS, Zenon (University of Warsaw)

Co-authors: Mr KUBIELA, Adam (University of Warsaw); Mrs CIEMNY, Aleksandra (University of Warsaw, Faculty of Physics); GORSHKOV, Alexander (FLNR JINR); BEZBAKH, Andrey (FLNR JINR); FOMICHEV, Andrey (JINR); Mr ZALEWSKI, Bogumil (Flerov Laboratory of Nuclear Reactions, sector 6, Heavy Ion Laboratory, University of Warsaw); Dr KAMIŃSKI, Grzegorz (JINR); Dr SLEPNEV, Roman (FLNR JINR); Mr KRUPKO, Sergey (FLNR); Mr CHUDOBA, Vratislav (FLNR JINR)

Presenter: Ms SOKOŁOWSKA, Natalia (University of Warsaw)

Track Classification: Experimental Nuclear Physics