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β-delayed neutron spectroscopy of ^{85,86}As with MONSTER

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A better quantitative understanding of β-delayed neutron emission rates and spectra is relevant for nuclear structure, astrophysics, and reactor applications. The field has experienced an increased activity during the last decades [1] thanks to the advances in nuclear experimental techniques and the radioactive ion beam facilities. More accurate measurements of β-delayed neutron emission properties like the emission probability, β-feeding, and energy spectrum from individual precursors are being made with advanced neutron detectors [2, 3, 4], digital data acquisition systems [5], and high intensity ion beams [6, 7, 8, 9].

The β-delayed neutron emission in the ^{85,86}As decays has been measured at the Ion Guide Isotope Separator On-Line (IGISOL) facility [9] of the JYFL Accelerator Laboratory of the University of Jyväskylä. The ^{85,86}As isotopes were produced by proton-induced fission reactions in ^{238}U, separated from the rest of the fission fragments with IGISOL, and implanted onto a tape. The complete decays have been studied with the help of a complex setup which consists of a plastic scintillator detector for the emitted β-particles and the \textbf{MO}dular \textbf{N}eutron time-of-flight \textbf{S}pectrome\textbf{TER} (MONSTER) [4, 10] for the detection of the emitted neutrons. MONSTER consists of an array of 48 cylindrical cells of 200 mm diameter and 50 mm height, filled with BC501A or EJ301 scintillating liquid. Each cell is coupled through a light guide of 31 mm thickness to a 5" diameter fast PMT. The neutron energy is determined by the time-of-flight technique, using the signals from the plastic detector and MONSTER as the start and stop signals, respectively.

In this conference, we report the results obtained from the measurement at JYFL. The β-delayed neutron energy distribution of the ^{85,86}As β-decays has been determined by unfolding the time-of-flight spectrum with the iterative Bayesian unfolding method [11]. We also compare the results of this work to existing data [12, 13].

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