



Investigation of characteristics of a BC-404 scintillator-based detector module

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Investigation of nuclear matter close to limits of its existence discovered a number of unusual phenomena, such as so-called Borromean nuclei, neutron halo and multiple nucleon decay. Near the neutron drip-line this multiple nucleon decay is manifested as emission of several neutrons. The investigation of this phenomenon is a non-trivial task due to limitations of previously developed techniques of neutron registration.

One of the current tasks at the ACCULINNA-2 fragment separator is development of a new time-of-flight neutron spectrometer with efficiency high enough for registration of several neutrons emitted in a singular event.

At the current time we are performing investigation of performance of CAEN VME flash ADCs, which are expected to be used for read-out of detector modules of the spectrometer. The students are invited to participate in this activity by measuring response of the detector modules to a gamma-source with different types of electronics and comparing the results. The comparison will be performed by means of the CERN ROOT framework [<https://root.cern/>]. The practice is organised for participation of up to two students and is planned to take three weeks in June–July 2026.

The tasks set a certain conditions on the skills of the students, which could participate in this summer practice. The major requirements are:

- Introductory level of understanding of interaction of charged particles with matter,
- Basic knowledge in handling of scintillator-based detectors and
- Intermediate level of skills in programming.

Also, a basic familiarity with CERN ROOT framework would be very welcomed.

The outcome of this summer practice will be practical skills in making and handling of scintillator detectors, basic familiarity with contemporary systems of data acquisition and ability to perform data analysis with CERN ROOT framework, using techniques common in subatomic physics.