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Characterization of a Large Batch of X3 Silicon Detectors for the ELISSA Array at ELI-NP

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Position-sensitive silicon strip detectors represent one of the best solutions for the detection of charged particles as they provide good energy and position resolution over a large range of energies. A silicon array coupled with the gamma beams at the ELI-NP facility would make it possible to measure photodissociation reactions of interest for Big Bang Nucleosynthesis and on heavy nuclei intervening in the p-process. Particular attention will be focused on the problem of 7Li primordial abundance, which remains an open question in nuclear astrophysics for more than 20 years. Several recent theoretical calculations could not reproduce the 3H(4He,γ)7Li cross section while agreeing to measured 3He(4He,γ)7Be parameters.
Forty X3 detectors for our ELISSA project have been recently purchased and tested. We investigated several specifications, such as leakage currents, depletion voltage, and detector stability under vacuum. The energy and position resolution, and ballistic deficit were measured and analyzed. This paper presents the main results of our extensive testing. The measured energy resolution for the X3 detectors is better than results published for similar arrays (ANASEN or ORRUBA). For the first time, remote-controlled motors were used to move the alpha source along the detector enabling automated detector scanning.
Details of future characterization of the X3 detectors with charged particle beams and a preparatory 7Li(γ,3H)4He experiment at High Intensity Gamma-Ray Source (HIGS) will be presented.

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