

Neutron Radiation Effects on the NUMEN Electronic 'System On Module'

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The NUMEN (NUclear Matrix Elements for Neutrinoless double beta decay) project was recently proposed [1], with the aim to investigate the nuclear response to Double Charge Exchange (DCE) reactions for all the isotopes explored by present and future studies of $0\nu\beta\beta$ decay. The expected level of radiation in the NUMEN experiment imposes severe limitations on the average lifetime of the electronic devices. During the experiments it is expected that the electronic devices are exposed to about 10^5 neutrons/cm²/s according to FLUKA simulations. This work investigates the reliability of the System On Module (SOM) by National Instruments (NI) under neutron radiation [2]. The tests were performed using thermal, epithermal, and fast neutrons produced by the *Instituto de Pesquisas Energéticas e Nucleares* (IPEN) 4.5 MW Nuclear Research Reactor. The results show the NI-SOM is robust to neutron radiation for the proposed applications in the NUMEN project.

References

- [1] Cappuzzello, F., et al., The NUMEN project: Nuclear Matrix Elements for Neutrinoless Double Beta Decay, *Eur. Phys. J. A*, 54:72, 2018.
- [2] Lo Presti, D., et al., *Review Scientific Instruments* 91, 083301, 2020.