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Neutron background monitoring for the IAXO-D0 detector prototype

The International Axion Observatory (IAXO) is a planned gaseous detector helioscope designed to detect axions, theorised to be dark matter candidates. A baseline detector prototype, IAXO-D0, is at present undergoing tests in Zaragoza. This prototype is sensitive to background high-energy neutrons that could induce false positive axion detections.

A neutron monitor has been proposed as a way to provide a continuous measurement of ambient neutrons. A prototype neutron monitor was designed and assembled. It consists of three He-3 proportional counter tubes surrounded by several layers of HDPE and lead. It has been in operation since March 2024 inside the laboratory where IAXO-D0 is being commissioned.

We present Monte Carlo simulations performed to characterise the monitor and the first results of the neutron count rate during the Forbush decrease observed in May 2024, once noise and pile-up have been taken care of, and atmospheric pressure effects have been corrected for.

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