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An Investigation Into the Susceptibility of Memory Cards to Neutron Damage

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The safeguarding of nuclear materials and facilities is a global challenge. There are different methods to maintain nuclear safeguarding, with a primary method being the use of cameras. Therefore it is fair to consider the vulnerabilities of the elements of this method of safeguarding. One of these vulnerabilities may be neutron damage to memory cards. This project aims to investigate whether a causal relationship exists between neutron damage and failure in memory cards. This investigation was carried out practically and experimentally, using the Lancaster University Californium-252 neutron source, which emits neutrons of between 1×10^{-10} – 1 MeV, to irradiate microSD cards of three different storage sizes, 32 GB, 64 GB, and 128 GB, in batches of five. A read/write function check program was written using C++ and uploaded to an Arduino Uno that ran the program through a microSD breakout circuit. This project also aimed to assist in the calculation of the activity of the Lancaster University 252Cf neutron source through the neutron activation of copper foils. This project has helped provide insight into the service life of memory cards in nuclear environments, contribute to the advancement of nuclear safeguarding and security, and influence the need for further research in this area, for example, the effect of higher energy neutrons on memory cards.

Primary authors: SRIDHAR, Raghuram; Prof. CROFT, Stephen (Lancaster University)

Presenters: SRIDHAR, Raghuram; Prof. CROFT, Stephen (Lancaster University)

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