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#4-273 Do Not Throw Away Old HPGe!

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Building an Automated Setup for Measuring and Reporting linear Neutron Flux Density distribution Using Activation Wires.

As advancements in nuclear instrumentation continue, the High Purity Germanium detectors, a mainstay in gamma spectroscopy, remains an invaluable tool. This poster presents the development and implementation of an automated system utilising an older High Purity Germanium detector and readily available materials for measurements of neutron flux density. Leveraging activation wires, automation and data processing methods, we devised a time-effective solution for linear distribution of neutron flux density inside MARIA research reactor.

Our approach incorporates automation for sample measurement - data acquisition, and reporting. After irradiating activation wires in the reactor, they are transported to the measuring setup. Hardware part consists of 2.6m lead housing with 10mm gap –collimator, linear drive, and High-Purity Germanium. Software is a combination of Windows scripts, REXX script and Python. Software integration enables automated gamma spectrum acquisition and neutron flux calculations, with results promptly stored and accessible in a digital format. This setup maximises the utility of existing High Purity Germanium detectors, reduces manual intervention, and provides reliable, standardised results.

We have measured samples of moderate and high dose rates. Using this setup allowed us to minimise radiation hazards, as well as measure several activation wires at once. One need to a priori select activation wires (mass and concentration) and calculate activities in order to get reliable results.

The project demonstrates that legacy High Purity Germanium detectors, with tailored automation and software support, remain highly effective for neutron flux density measurements. Our work underscore the potential to modernise nuclear measurement facilities without discarding established instrumentation, presenting a compelling case for integrating older detectors in contemporary nuclear systems. This innovation fosters both cost efficiency and sustainability in nuclear measurement technologies, with implications for reactor measurements, radiation protection.

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