

Upgrade of the Necsa neutron radiography instrument

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Neutron radiography has been conducted at the SAFARI-1 research reactor since the early 1970's. Digital neutron radiography commenced in 1996 and a 3D tomography capability was installed in 2003. Major deficiencies regarding corrosion of water cooling pipes of the internal collimator as well as shielding and control infrastructure were identified to be addressed in the design of new state-of-the-art neutron radiography instrument.

A bismuth filter that limited the utilisation of the beam port is being replaced by a multiple filter exchange unit allowing for radiography using either fast or thermal neutrons or the gamma-ray component of the beam. Due to the optimization of the neutron optics, the field of view on the detector plane was improved from $5 \times 5 \text{ cm}^2$ to $35 \times 35 \text{ cm}^2$. The highest neutron flux anticipated will increase from 1×10^7 to $1 \times 10^9 \text{ n.cm}^{-2}.\text{sec}^{-1}$. Shielding design was improved to allow $< 1 \text{ }\mu\text{Sv/hour}$ dose rate on contact at the outside wall. To minimise stray neutron scattering towards the detector, the size of the experimental chamber is increased from $2 \times 2 \times 2 \text{ m}^3$ to $8 \times 5 \times 2 \text{ m}^3$ and is lined with a 200 mm thick layer of B-PE. To improve towards the full utilisation of available beam-time, comprehensive experiment control, data analysis and user-office management systems will be implemented.

Formal Invitation Letter Required

Yes

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