

# IAEA Training Workshop: Advanced Use of Neutron Imaging for Research and Applications: AUNIRA



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## Neutron imaging at Phoenix Nuclear Labs

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Michael Taylor, Phoenix Nuclear Labs, USA

michael.taylor@phoenixnuclearlabs.com

Phoenix Nuclear Labs has designed, constructed and is currently testing a high-flux accelerator-based neutron generator to be used for thermal neutron imaging. The unit provides a source of moderated neutrons, collimated to an image plane where samples can be placed and various neutron detectors may be used to capture neutron images. The system is designed to yield  $3 \times 10^{11} n/s$ , with an expected  $1.4 \times 10^4 n/cm^2 - s$  thermal neutrons at the image plane at a given collimation ratio as predicted by Monte Carlo N-Particle (MCNP) transport code. The cadmium ratio, a metric to quantify how well thermalized the beam is, has also been modeled in MCNP. Current measurements of the above metrics are ongoing but appear to match design parameters well at the present. Neutron output is continually increasing by optimizing the accelerator performance. The system is expected to produce ASTM category III (or higher) neutron images based on the metrics of signal to noise ratio, contrast sensitivity, thermal neutron content, gamma content, scattered neutron contribution and image resolution. The current status of the system, in particular the imaging parameters, are discussed in this paper.

**Primary author:** Mr TAYLOR, Michael (Phoenix Nuclear Labs)

**Presenter:** Mr TAYLOR, Michael (Phoenix Nuclear Labs)

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