Contribution ID: **99** Type: **talk**

Comparison between simulated neutron interactions and captured images for fast neutron imaging

Neutron imaging with digital imaging detectors has recently been introduced and is driving the development of modern neutron imaging instruments. In most cases, scintillator screens are used in conjunction with complementary metal oxide semiconductor (CMOS) cameras, with the ability to read out images digitally. The scintillator in combination with a CMOS astro camera is superior in terms of dynamic range, signal-to-noise ratio and thus provides improved image quality. The detector system has a strong influence on the achievable image quality. Several detector components need to be optimized, such as the optical lens system and the scintillator screen, both of which are the focus of ongoing improvements. However, even with technically optimized neutron imaging setups, there is almost always a trade-off between exposure time and spatial resolution. These factors can be optimized and will vary depending on the experiment and instrumentation setup. This paper focuses on the experimental verification of simulations performed for simple objects and the response of the scintillator crystal to the incident neutron flux. The GEANT4 code is used to model neutron-proton interactions, with the output in the form of a radiographic image. Simulated and experimental images are compared and the performance of both systems is verified. The purpose of this paper is to quantify the difference between the simulated and captured images and to identify areas for improvement of the developed neutron radiography system. The results are the first step for future optimization of neutron radiography experiments using the plastic scintillator detector and fast neutron sources.

Workshop topics

Imaging theory

Author: REVAI, Filip

Co-authors: VRBAN, Branislav; LÜLEY, Jakub; GLAVO, Otto; FILOVÁ, Vendula; NEČAS, Vladimír; ČERBA, Štefan

Presenter: REVAI, Filip