

## Investigation of neutron collimation method in the device for small-scale neutron imaging

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Fusion reactions, such as the D-D and D-T reactions, can be used to produce neutrons in smaller devices than conventional neutron sources such as nuclear reactors and large accelerators. Compared to conventional methods, this neutron source enables to make imaging devices smaller and more convenient.

The Small-scale neutron imaging device is consisted of a neutron source, detectors, and other imaging equipment, and a neutron shielding material that covers them. Because of the smaller space inside the device compared to conventional imaging devices, the distance between the wall and the detector is closer, and neutrons reflected and scattered by the wall are more frequently incident on the detector. Therefore, it is necessary to collimate by placing shield materials around the neutron source and the detector to prevent scattered and reflected neutrons from entering the detector. A suitable neutron shielding is necessary to ensure the supply of neutrons to the detector and to prevent the incident of scattered or reflected neutrons on the detector. Experiments were performed using PHITS to simulate neutron imaging using a small neutron source in a small-scale neutron imaging system. A neutron shielding material was placed around the source and detector to collimate the neutrons incident on the detector. High-density polyethylene with boric acid was used as the shielding material. The length of the shielding material and the distance between the source and detector were varied, and the change in neutrons incident on the detector was evaluated by changing the collimation situation.

### Topics

Session D. Biomedical optics and sensors technology

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