

Thermal neutron radiography at NESSA

Master work in applied nuclear physics

Engineering Programme / Master in Physics – Degree project (Exjobb)

Duration: 20 weeks (30 credits), autumn semester of 2016.

Description:

The Applied Nuclear Physics division is currently for the startup of a neutron lab, NESSA. In this lab fusion neutron generators are supply neutrons for various research topics. One of the planned topics is neutron radiography and tomography, using thermal and fast neutrons.

In this master work, the plan is to evaluate the usage of NESSA for thermal neutron radiography. In such work a moderator, consisting of light elements, is used to thermalize the fast neutrons emitted by a fusion neutron generator. The thermal neutrons may offer a more beneficial contrast in transmission imaging of light elements in general. In addition the contrast may be enhanced by adding neutron poisons to the object.

The work entails the preliminary conceptual design of a moderator and the detector system. Using the derived system properties, the neutron spectrum can be evaluated using radiation transport codes. The contrast offered by the system in the inspection of proposed objects is evaluated, and the irradiation time requirements are determined based on the source strength of the source.

Any experience in radiation physics, radiation transport codes and ionizing radiation detectors is of particular merit in this project.

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