

# Simulation studies for the development and construction of a demonstration facility for radiography with fast neutrons

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In cooperation between University, Research Center and Industry we develop a compact demonstration facility. A D-T neutron generator with energies of 14.1 MeV was selected as neutron source. Neutrons with high energy are able to penetrate large and dense objects, like concrete structures. Several simulation studies are in progress to identify critical aspects of neutron and photon transport. One of the main tasks is to investigate and simulate the effect of neutron and gamma self-shielding in the objects, which is a challenge for non-destructive structural analysis of large objects like archeological artifacts, i.e. sarcophagus or large metallic objects with cavities like bronze statues. Therefore the feasibility to distinguish between different material groups like heavy metals and organic substances has to be verified. Furthermore, detailed simulations of the neutron and photon transport in the system will be performed in order to determine the best approaches to minimize the noise and optimize the contrast of the radiographic pictures. The simulations will be performed using the simulation tools MCNP5, MCNPX and FLUKA.

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