



Contribution ID: 39

Type: Oral presentation

Imaging military nuclear reactors with GScan's detector system

Wednesday 21 June 2023 16:30 (20 minutes)

Atmospheric ray tomography (ART) applies muons and electrons for imaging the 3D density and atomic composition of the scanned objects. In this talk, we will describe an industrial prototype system for ART-based technology developed by the company GScan. The prototype uses plastic scintillating fibre arrays achieving the spatial resolution 120 μm and 1 mrad angular resolution in the track reconstruction with a rather compact and lightweight design. The system is based on laboratory proof-of-concept described in an earlier study. We will explain the key components of the developed production technology of the detectors.

In this talk, we will present the results of 3D imaging of two out-of-use military (submarine) nuclear reactors using the GScan-developed detector systems. The total scanned volume is relatively large and complex: the submarine sections containing the reactors, machinery and filling material are 7 to 9 metres in their diameter.

Firstly, we will show the results of the numerical Geant4 modelling and in-house tests which have demonstrated the ability to achieve 10 cm spatial resolution in a reasonable amount of time. Secondly, we will present the results of the field measurements at the reactor site. In addition we will compare the physical results against the numerical ones.

Authors: MÄGI, Märt (GScan OU); KIISK, Madis (GScan OU & Tartu University)

Co-authors: AKTAS, Kadir (Tartu University); AKSONOV, Artem (GScan OU); ANIER, Aivo (GScan OU); GULLIK, Volodymyr (Tartu University & GScan OU); HEKTOR, Andi (GScan OU & KBFI, Tallinn); HRYTSIUK, Christina (Tartu University); LEPP, Tõnu (GScan OU); METSPALU, Tarvo (GScan OU); PRIIDEL, Eiko (GScan OU); SEIN, Sander (GScan OU); TIIT, Jörg Miikael (GScan OU, KBFI & STACC OU)

Presenters: MÄGI, Märt (GScan OU); KIISK, Madis (GScan OU & Tartu University); HEKTOR, Andi (GScan OU & KBFI, Tallinn)

Session Classification: Nuclear waste characterization and safeguards