Contribution ID: **103** Type: **Panelist (Panel Session)**

Developments in Fresh Fuel Collar Measurements with Fast Neutron Detection

Tuesday, 6 November 2018 16:07 (7 minutes)

The neutron coincidence counting (NCC) method has been applied for many years in nuclear safeguards. This method is beneficial in allowing large items, such as fuel assemblies, to be interrogated evenly, leading to precise and accurate non-destructive assay measurements of fissile materials. Traditionally NCC has been performed with helium-3 detectors with measurements of thermalized neutrons and has worked very successfully. Currently, however, it is common practise to add burnable neutron poisons into fuel matrices which adds an additional influence into the assay measurements which has to be considered and addressed with ultimate effects of large extensions of measurement times or by large correction factors.

CAEN S.p.A and the IAEA are currently applying a novel approach to solve this problem of measuring fuels containing burnable poisons. The use of fast neutron detectors coupled with fast digitizing electronics and bespoke software and analysis algorithms allow NCC to be performed with fast neutrons. A series of optimised digital filters including time-coincidence, pulse-shape discrimination, pile-up and cross-talk rejection, are used on-the-fly to isolate coincident neutrons produced in the same fission with very high precision and at very high detection rates. The outcomes are that fuel assemblies can be assayed quickly, precisely and without large correction factors, thereby greatly improving the performance of fresh fuel collar measurements. The recent developments of the fast neutron coincidence collar (FNCL) and performance of the system are discussed.

Which ”Key Question” does your Abstract address?

TEC3.1

Topics

TEC3

Which alternative ”Key Question” does your Abstract address? (if any)

Primary authors: Dr ANGELUCCI, Bruno (CAEN); Mr RAFFO, Claudio (CAEN); Mr ROGO, Francesco (CAEN); Dr BAEUMONT, Jonathan (IAEA); Dr MORICHI, Massimo (CAEN SyS); Dr CORBO, Matteo (CAEN SyS); Dr MAYOROV, Mikhail (IAEA); Dr LEE, Taehoon (IAEA)

Presenter: Dr MORICHI, Massimo (CAEN SyS)

Session Classification: [TEC] Advancements in Instrumentation Data Processing and Analysis

Track Classification: Leveraging technological advancements for safeguards applications (TEC)