



Contribution ID: 156

Type: Oral Presentation

A new instrumental activation analysis facility at UCT

Thursday, 29 July 2021 16:00 (15 minutes)

Instrumental neutron activation analysis (INAA) is a non-destructive technique used for qualitative and quantitative elemental analysis in a range of contexts, including the food, coal and minerals processing industries, and the detection of contraband. Broadly, INAA requires the irradiation of a sample in a neutron field, and the neutron interactions within the sample to produce radioactive isotopes with characteristic gamma ray emissions. These characteristic gamma ray emissions are then detected using a gamma ray spectrometer and further analysed to determine elemental composition.

In 2017, the UCT Department of Physics commissioned the n-lab, a fast neutron laboratory centred around a Thermo MP-320 deuterium-tritium sealed tube neutron generator (STNG) and a 220 GBq Americium-Beryllium (Am-Be) radioisotopic source. The aims of this project are to characterise the n-lab as an INAA facility, and to develop standardised analysis protocols for the elemental analysis of bulk materials. Fundamental to INAA is knowledge of the number and energy distribution of neutrons incident upon the sample of interest. The process of determining the neutron flux by the activation of foils is presented, in addition to the recent results from the activation of copper and aluminium samples by the STNG. The next stages of this project are discussed with respect to measurement and radiation transport simulations, with a particular focus on the use of pulsed 14.1 MeV neutron beams produced by the STNG.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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Session Classification: Applied Physics

Track Classification: Track F - Applied Physics