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A new Instrumental Neutron Activation Analysis facility at UCT

Instrumental Neutron Activation Analysis (INAA) is one of the most sensitive techniques to non-destructively determine the isotopic composition of a sample. The sensitivity of the technique is determined by the isotope of interest, intensity of the neutron source and neutron energy spectrum. In the case of thermal neutron irradiation with a nuclear reactor the minimum detection limits tend towards the level of ppb. We are in the process of implementing a new INAA facility within the Metrological and Applied Sciences University Research Unit (MeASURe) in the Department of Physics, University of Cape Town. The n-lab currently offers two neutron sources, a D-T sealed tube neutron generator (STNG) and radioisotopic 241Am/9Be source. The STNG produces mono-energetic neutrons of around 14 MeV, with an intensity of 10E8 neutrons per second, and the 220 GBq AmBe source produces neutrons with a broad energy spectrum, ranging from thermal to 11 MeV.

The first experimental phase will determine the limits of detection for a range of isotopes with the existing experimental set-up. This will be supplemented with simulation driven designs for neutron moderators, multipliers and reflectors in order to lower these limits.

Primary authors: MHLONGO, Sizwe (University of Zululand); BUFFLER, Andy (UCT); HUTTON, Tanya (University of Cape Town)

Presenter: MHLONGO, Sizwe (University of Zululand)

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