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Elemental analysis and Activation in Kimberlite using delayed gammas after GDR photon induced activation.

Thursday, 28 June 2018 15:00 (2 hours)

Element analysis as a nuclear activation analysis technique (gamma,x) using photons above the Giant Dipole Resonance and the (gamma,x) reactions is a novel development. In these studies the excited nuclei decay by photon emission and these photons can be detected using time stamped event-by-event data acquisition with multiple gamma detectors. In this way, the resulting spectra can be multi-dimensional as (energy, time) or (energy, energy). The ambiguity in the identification of the decaying nuclide is well resolved considering unique sequential decay chains or using the extracted lifetime for a given gamma energy. The data was acquired on a time scale of minutes to weeks following activation, so that a wide range of activated nuclide lifetimes could be identified. The samples were various kinds of kimberlite rocks. A benchmark analysis using XRF was also performed. The elemental analysis technique is potentially of interest for non-destructive geochemical analysis. The study had a dual purpose in that it is also relevant to the study of nuclide activation that is of importance to the MinPET technique as elaborated in companion presentations. The experiments were carried out at the electron injector microtron of the ASTRID storage ring of the ISA, Centre of Storage Ring Facilities at the Department of Physics in Aarhus University, Denmark.

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