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Running out of patience for radionuclide decay: Accelerator mass spectrometry (AMS) counts faster

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Accelerator mass spectrometry (AMS) is the most sensitive analytical method to measure long-lived radionuclides. Several AMS system has been recently established in Europe, however, most of them exclusively detecting carbon-14. At Dresden a 6 MV tandem accelerator is used for AMS since 2011: The DREAMS (DREsden AMS) facility [1-3] is part of the Ion Beam Center, a large-scale user facility, where users apply for measurements via a proposal system.
Radionuclides, which are routinely measured at DREAMS, are ¹⁰Be, ²⁶Al, ³⁶Cl, ⁴¹Ca, and ¹²⁹I. We recently also focussed on nuclides with shorter half-lives such as ⁷Be or ⁴⁴Ti. The detection limits are generally several orders of magnitude better than any other mass spectrometry or decay counting method. AMS needs smaller sample sizes and measurements are finished within a few minutes to hours; though after performing chemical separation of the radionuclide from the sample matrix (ice, snow, rain, ground water, marine sediments, soil, meteorites, deep-sea nodules, lava, rocks).
DREAMS users apply AMS to most diverse interdisciplinary projects. Prominent examples are the proof and dating of multiple supernovae during the last 10 Ma [4] and dating of a boulder from a rock fall triggered by a medieval Earthquake in the Nepal Himalaya [5].
Ref.: [1] Akhmadaliev et al., NIMB 294 (2013) 5. [2] Rugel et al., NIMB 370 (2016) 94. [3] www.dresden-ams.de. [4] Wallner et al., Nature 532 (2016) 69. [5] Schwanghart et al., Science 351 (2016) 147.

Authors: MERCHEL, Silke (HZDR); Mr LLOVERA, Roberto (Helmholtz-Zentrum Dresden-Rossendorf); RUGEL, Georg (Helmholtz-Zentrum Dresden-Rossendorf); Dr SCHARF, Andreas (Helmholtz-Zentrum Dresden-Rossendorf); DREAM-S-USERS

Presenter: RUGEL, Georg (Helmholtz-Zentrum Dresden-Rossendorf)

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