Großes Physikalisches Kolloquium an der Universität zu Köln

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What do isotope signatures of long-lived radionuclides tell us about their emission sources?

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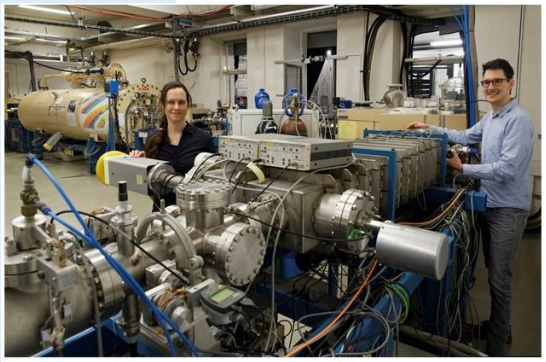
16^{30} Uhr
HS III

Since the beginnings of the „nuclear age“, man-made radionuclides have been released into the environment either by atmospheric nuclear weapons tests, nuclear accidents or from the nuclear fuel cycle. Long-lived radionuclides like uranium (U), plutonium (Pu) or technetium (Tc), are mostly not an immediate hazard due to their low specific activity, but they will be part of our environment over thousands of years and require long-term monitoring. A comprehensive understanding of their environmental migration behaviour is essential to protect the population from future exposure and also for the application of these radionuclides as tracers to study environmental transport processes, e.g. ocean currents. For this purpose, contributions from sources other than the globally distributed nuclear weapons fallout need to be quantified to determine the distribution pathways to the sampling station. Isotopic ratios of radionuclide releases into the environment have proven to be useful signatures for contamination source identification.

The concentrations of such radionuclides in the general environment are fortunately still extremely low so that their analysis requires an ultra-sensitive method like Accelerator Mass Spectrometry (AMS). After a general introduction to the AMS technique, the sources for anthropogenic radionuclides and their expected characteristic isotope signatures emitted into the environment will be introduced in the talk. Selected projects carried out at the AMS facility VERA (Vienna Environmental Research Accelerator), for which source identification is highly relevant like the search for a marker to identify the basis of the proposed new geological age of “the Anthropocene”, will be presented. On-going developments involving the unique instrumentation for Ion-Laser-Interaction Mass Spectrometry, e.g. for the very challenging detection of ^{99}Tc or ^{135}Cs, will be touched in this context.



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