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Tracing Environmental Radionuclides with the HAMSTER

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Accelerator Mass Spectrometry (AMS) has long been established as a prime technique to measure an array of long-lived radionuclides in the environment. Radiocarbon has been established first, and later the method has been expanded to include ^{10}Be, ^{26}Al, and ^{129}I, to name but a few. The method originally developed on large nuclear physics tandem accelerators with terminal voltages of 6MV and more, over time has been taken to ever lower energies.
The Helmholtz Accelerator Mass Spectrometer Tracing Environmental Radionuclides (HAMSTER) was incepted as a novel AMS system to detect radionuclides across the chart of nuclides. It is based on a small accelerator with 1MV terminal voltage. With its high mass resolution and background suppression of scattered interference, the system is particularly well-suited for the measurement of heavy isotopes such as the actinide nuclides. It will also feature an ion-cooler injection beam-line for laser photodetachment, a new method to do isobar separation at low energies. We will use this feature to add ^{90}Sr, ^{135}Cs, ^{137}Cs, and ^{182}Hf to our repertoire of isotopes, with many more to be tried in the future. Together with our established isotopes we will implement new applications in Astrophysics, Nuclear Physics, Geology and Environmental Physics. These includes tracing ocean currents, detecting supernova isotope signatures deposited on earth and moon, nuclear decommissioning, landscape erosion and many more. In this talk we will present the AMS methods, the new ion beam methods available at HAMSTER, and the on-going and planned applications.

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