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HAMSTER –a new universal 1-MV AMS facility at HZDR with ion cooler and SIMS capabilities

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The new dedicated AMS facility HAMSTER (Helmholtz Accelerator Mass Spectrometer Tracing Environmental Radionuclides) is being set up at HZDR as a universal and flexible AMS system that allows for routine measurements of nuclides across the whole chart of nuclides but has also a focus on implementing new technical developments.
HAMSTER is based on a 1-MV Pelletron accelerator (National Electrostatic Corp., NEC). It consists of three independently operating beam injection systems: two of them are high-intensity ion sources for negative ions, one coupled to an ion-cooler setup. Finally, another ion beam from a dynamic SIMS setup (CAMECA IMS 7f Auto), previously connected to the DREAMS 6-MV system (HVEE Tandetron), can be injected into the AMS beamline for Trace Element Accelerator Mass Spectrometry (TEAMS) measurements.
The high-energy side includes two magnets with the option of quasi-simultaneous measurements of up to 8 isotopes. Special focus was a setup aiming for a high measurement efficiency as well as implementing the options of full beam diagnostics at all waists with the objective to facilitate further technical developments for rare isotope detection.
A new ion cooler ILTIS (Ion Linear Trap for Isobar Suppression) had been developed in-house in collaboration with the Univ. of Vienna to utilise and explore the potential of ion-laser interaction for detection of new AMS nuclides. NEC's accelerator software will be integrated into our general EPICS-based control software, which is presently under development at HZDR.
HAMSTER is located in a dedicated new building that houses also three labs for sample handling and sample preparation, which add to the two chemistry labs already in use since about 15 years. The new facility is operated as a dedicated AMS system - with the 6-MV DREAMS facility still being used in parallel. However, HAMSTER will extend our research portfolio significantly beyond DREAMS's primary focus on cosmogenic nuclides.

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