Institute of Ion Beam Physics and Materials Research

Accelerator Mass Spectrometry & Isotope Research @HZDR

… AMS: best known for radiocarbon dating (^{14}C)

… now: many more applications due to recent new developments – see lecture SS2021

… exciting: presently - planning and installation of new facility & new instruments

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DRESDEN concept

HZDR

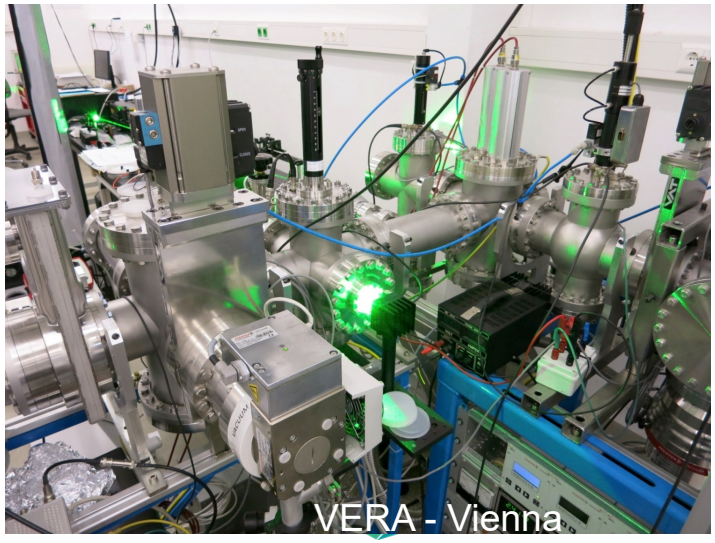
NEW ION ACCELERATOR FOR AMS AT HZDR

atom counting of rare isotopes
=
most sensitive method

detection of smallest amounts of natural and anthropogenic radionuclides

Ion (Atom)-Laser interaction for (acc.) mass spectrometry:

→ single (!) atom counting: improvements in background reduction and efficiency = new playground



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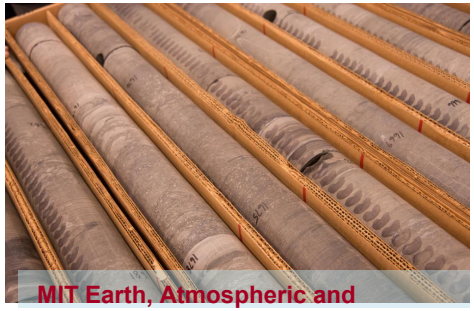
Research topics - Nuclear astrophysics studies

- Search for **r-process signatures**
- **Nearby supernova-explosions** in the past - via fresh radionuclides deposited on Earth
- Extraterrestrial cause for Cretatious-Tertiary mass extinction (dinosaurs)
- **Nucleosynthesis** studies in the laboratory
- Contribute to the search for **Dark Matter**

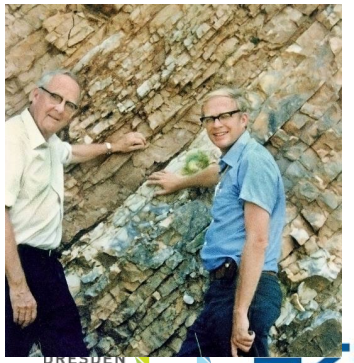
- ❑ **'how were the heavy elements made' we observe on Earth today?**
- ❑ **do Supernovae and/or neutron star mergers produce the heavy elements?**
- ❑ **do nearby Supernovae impact on Earth's climate and temperature history?**



MIT Earth, Atmospheric and Planetary Sciences

ANSTO, Sydney

lunar samples (Apollo missions)



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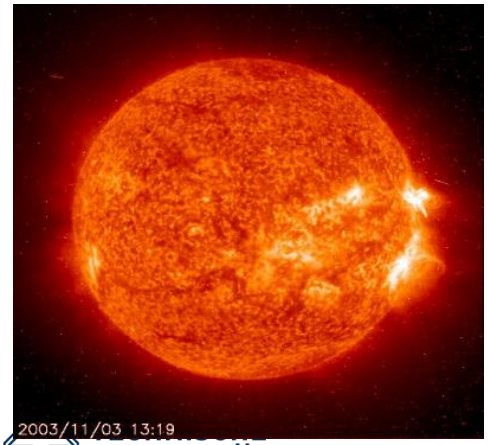
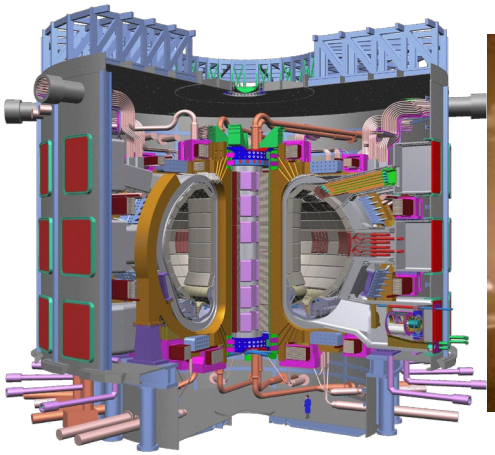
Research topics:

- ❑ **Environmental and geological applications**
- ❑ **Nuclear safeguards**
- ❑ **Medical applications**

- Climate research – Earth's climate record in the past
- nuclear activities: U, Pu, fission products in the environment
- nuclear fusion reactions
- specific needs for medical isotope production
- forensic science





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