AGA 8: Acoustic and Seismic Signals for Safeguards and Verification

Time: Wednesday 17:00–18:00 Location: EMH 225

AGA 8.1 Wed 17:00 EMH 225

Nuclear Safeguards at an Underground Final Repository in Salt - Seismic-Signal Modelling for Detectability — •Jürgen Altmann — Experimentelle Physik III, TU Dortmund, 44221 Dortmund

Final repositories for spent nuclear fuel need to be put under safeguards of the International Atomic Energy Agency (IAEA) to detect undeclared access, during and after the emplacement phase. Following a measurement project at the Gorleben exploratory mine, the next task done for the German Support Programme to the IAEA was to model the propagation of seismic signals caused by mining activities to potential monitoring sites around and within the salt dome. For impulsive and periodic sources the seismic propagation is computed in three dimensions on the LiDO cluster of TU Dortmund using the open program SpecFEM3D. Signal forms and spectra reflect the boundaries of the various layers and their attenuation, modelled by constant quality factors. From the amplitude decrease with distance detection ranges for relevant mining activities are estimated by comparison with typical background noise. This allows conclusions on the required density and number of sensors for a seismic monitoring system.

AGA 8.2 Wed 17:30 EMH 225

Acoustic-Seismic Coupling of Broadband Signals - Analysis of Potential Disturbances during CTBT On-Site Inspection Measurements — •Mattes Liebsch — Experimentelle Physik III, TU Dortmund

In the framework of the verification of the Comprehensive Nuclear Test-Ban Treaty (CTBT) the localization of possible buried nuclear explosion sites is important. In order to localize these sites sensitive seismic measurements of so-called aftershocks can be performed, which, however, can be disturbed by different signals. In this research we focus on disturbances caused by airborne sources: When sound of aircraft hits the ground it excites soil vibrations which can mask weak aftershock signals. With a better understanding of the acoustic-seismic coupling we aim to suggest new guidelines to improve sensitve seismic CTBT on-site inspection measurements. We measured sound pressure and soil velocity of various sources e.g. jet-aircraft. In the seismic data we observed interference patterns which can be used to estimate the path(s) of propagation of acoustically induced soil vibrations. The frequency-dependent phase offset between different sensors is used to estimate the propagation velocity of soil vibrations.