# AKA 8: Detection and Verification

Time: Friday 11:15–12:45 Location: H 0110

AKA 8.1 Fri 11:15 H 0110

**Modelling of global atmospheric Krypton-85 concentrations for detection of unreported nuclear reprocessing** — •Ole Ross[1], Martin Kalinowski[1], Johann Feichter[2], Sebastian Rast[2], and Heinke Schlünzen[3] — [1]Carl Friedrich von Weizsäcker Centre for Science and Peace Research, Unversity of Hamburg — [2]Max Planck Institute for Meteorology, Hamburg — [3]ZMAW, Meteorological Institute, University of Hamburg

Concentration measurements of radioactive noble gas isotopes play an important role for the verification of nuclear arms control treaties. The current project deals with Krypton-85, which is an indicator for plutonium separation and thus relevant to the IAEA Safeguards of the Non Proliferation Treaty. The goal of this project is to assess the feasibility of detection of undeclared nuclear reprocessing through $^{85}$Kr measurements and atmospheric transport modelling. In the presentation an overview about different approaches in atmospheric tracer modelling is given and the properties of $^{85}$Kr compared to those of the Xenon isotopes used for the verification of nuclear explosions are discussed. For the determination of the global $^{85}$Kr background concentrations due to known reprocessing facilities the General Circulation Model ECHAM5 was used. After implementation of the emission sources the tracer transport properties of the model were investigated and improved. First results of global $^{85}$Kr tracer distributions are shown and compared with previous studies. The spatial and temporal variability of the model results and the sensitivity to different emission patterns are analysed.

AKA 8.2 Fri 11:45 H 0110

**Implications of medical isotope production on nuclear arms control** — •Britta Riechmann and Martin Kalinowski — Carl Friedrich von Weizsäcker Zentrum für Naturwissenschaft und Friedensforschung, Universität Hamburg

Most isotopes that are used for medical applications are produced from targets of highly enriched uranium (HEU). This has two implications for nuclear arms control. HEU can be used to manufacture nuclear weapons and the release of fission gases interferes with the verification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). While the global demand of HEU for research reactors is declining, the use of HEU for medical isotope production is increasing and likely hitting an annual consumption level of 100 kg soon. Most radioactivity is removed by chemical separation and as a result the radiation barrier is low. The radioactive xenon that is used as atmospheric indicator for nuclear explosions. A single extraction plant can release in the order of 1015 Bq of xenon-133 per year. In addition, due to the short irradiation time, the isotopic signature is similar to that of nuclear explosions.

AKA 8.3 Fri 12:15 H 0110

**Infraschall in Bodennähe und die Nutzbarkeit für konventionelle Abrüstungsverifikation** — •Christoph Weber, Felix Gorschlüter und Jürgen Altmann — Experimentelle Physik III, TU Dortmund, 44221 Dortmund

Das Bochumer Verifikationsprojekt beschäftigt sich seit über fünfzehn Jahren mit naturwissenschaftlichen Methoden zur Abrüstungsverifikation im konventionellen Bereich. Ein Ansatz hierzu ist der akustisch-seismische, dessen Ziel es u.a. ist, anhand spezieller Geräusch- oder Vibrationssignaturen Fahrzeugtypen zu erkennen. Wir arbeiten speziell im Infraschallbereich und greifen dabei auch auf Erfahrungen zurück, die in der Verifikation des Kernwaffenteststopps gemacht wurden, mit der für die Bundesrepublik die Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) beauftragt ist. Die BGR hat bei Bremen immer wieder Signale beobachtet, die sich an der Grenzfläche Erde-Luft mit einer Geschwindigkeit von etwa 300 m/s ausbreiten und deren Frequenz bei 4 Hz liegt. Von Interesse ist neben der physikalischen Beschreibung dieses Wellentyps auch dessen Nutzbarkeit für die Abrüstungsverifikation.