# ST 7: Radiation Physics Measurements

Time: Thursday 16:00–16:45 Location: POT 112

ST 7.1 Thu 16:00 POT 112

**Performance of new Solid State $\gamma$-detectors in $^{57}$Fe Mössbauer spectroscopy experiments** — •Til Dellmann and Hans-Henning Klauss — Institute of Solid State Physics, TU Dresden

Usually, proportional counter tubes are used in $^{57}$Fe Mössbauer spectroscopy for the detection of the 14.4 keV transition line. The recent developement of Si-based solid state detectors led to commercially available drift detectors (SDD) and high purity PiN diodes without the necessity of cooling with liquid nitrogen. First applications of SDD detectors in the analysis of minerals [1] are already highly promising.

In this talk, we will present a detailed comparison between the three detector types and their use in moessbauer spectroscopy using a standard absorber-source-combination (metallic iron with a 2.0 GBq $^{57}$Co/Rh source) in absorbtion geometry. Starting with the definition of a global efficiency function, which optimises the goodness of a moessbauer spectrum and thus the required measurement time, we examined the influence of the intrinsic detector parameters on the global efficiency.

[1] Tudor Ruskov et al., Phys Chem Minerals 35 (2008)

ST 7.2 Thu 16:15 POT 112

**Set up of a low-level radon reference chamber** — •Diana Linzmaier[1,2], Jörg Leppelt[1], and Annette Röttger[1] — [1]Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig — [2]Leibnitz Universität Hannover, Fakultät für Mathematik und Physik, 30167 Hannover

In order to calibrate measuring devices for the activity concentration of Rn-222 in air below 1000 $Bq/m^3$, a low-level radon reference chamber is under construction. For the realisation of the unit $Bq/m^3$ at such low radon activity concentrations, a high-sensitive transfer standard has to be developed.

The concept of the low-level radon chamber is based on the realisation of the atmosphere, in form of a standard vacuum chamber with an activity standard and a transfer standard (active large volume detector, serving as a secondary standard).

The realisation of the atmosphere consists of a reference volume of $0.5\,m^3$ and a system for the radon emanation. A defined activity of Rn-222 diffuses out of a source and is transported through an noble gas leak-proof circuit to the reference volume to create a reference atmosphere.

The transfer standard is used for the spectrometry of $\alpha$-particles. It is composed of a multi-wire pulse ionisation chamber with a detector volume of $10\,l$. To detect and amplify the signals, an optimised pre-amplifier is being built.

The concept of the reference chamber and first results will be presented and discussed.

ST 7.3 Thu 16:30 POT 112

**Calibration of tissue-equivalent proportional counters with the PTB neutron reference fields** — •Johannes Rahm[1,2], Joachim Breckow[1], Oleksiy Burda[2], Thorsten Klages[2], Frank Langner[2], and Frank Wissmann[2] — [1]Institut für medizinische Physik und Strahlenschutz, Fachhochschule Gießen-Friedberg, Wiesenstraße 14, 35390 Gießen — [2]Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig

Dose determination in microdosimetric dimensions is essential for radiation protection, as well as for radiation biology and radiation therapy. Especially in mixed radiation fields with a large neutron component a tissue-equivalent proportional counter (TEPC) is an excellent instrument for dose measurement.

The TEPC response to neutrons was measured using the PTB neutron reference fields at energies of 0.606 MeV, 1.2 MeV, 8 MeV and 19 MeV. To determine dose and dose-equivalent microdosimetric spectra, a system with three gain stages was set up to cover a lineal energy range from $10^{-2}$ keV/$\mu$m up to $10^4$ keV/$\mu$m. Two spherical TEPCs with a diameter of 2.24" were filled with a propane based tissue-equivalent gas mixture to simulate a tissue diameter of 2 $\mu$m and 4 $\mu$m, respectively. The aim of this work is to investigate the influence of different gas fillings and to obtain the response function of the TEPC with regard to monoenergetic neutron reference fields.