Ionizing Radiation metrology at the BIPM

Radionuclide metrology

Replacing hazardous radium sources

BIPM, IRA (Switzerland), LNHB (France) and NPL (UK)

Radium sources are used world-wide for instrument quality control, including the international reference system for gamma emitting radionuclides (SIR). The project team is preparing and testing ^{166m}Ho sources as a safer alternative.

Improving ionization chambers

BIPM, NIST (USA), PTB (Germany) and CCEM

Developments in electrical metrology offer better linearity and reproducibility for these instruments - CCEM/CCRI have held a joint workshop at NIST to discuss approaches, and testing of new technology starts in 2019.

Comparing standards of beta-emitting radionuclides

BIPM, LNHB (France), POLATOM (Poland), PTB (Germany), NPL (UK) plus NIM (China) and NIST (USA)

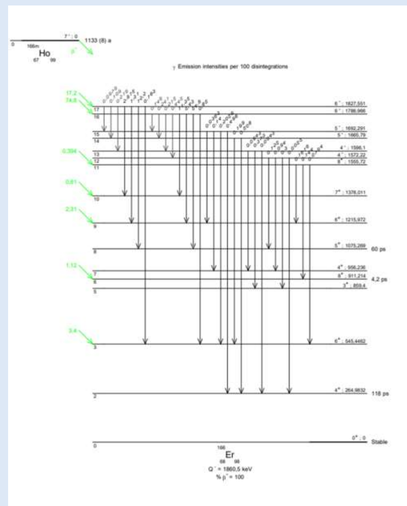
A new instrument is being set up at the BIPM to compare standards of beta-emitting radionuclides. The project builds on a comprehensive study carried out in 2017 by secondees from NIM (China) and NIST (USA).

Running comparisons

BIPM, CCRI

Comparisons of gamma-emitting radionuclides have continued using the SIR (based at the BIPM) for long-lived radionuclides and the SIRTI (used on NMI sites) for short-lived radionuclides.

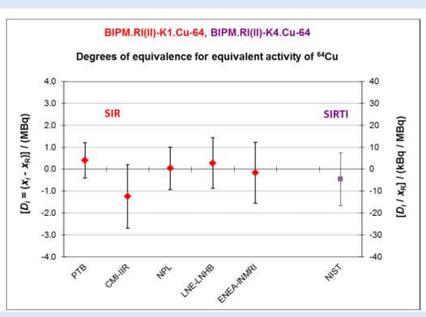
The SIR international reference system enables NMIs to compare standards of gamma-emitting radionuclides, including a comparison of ^{241}Am needed for characterizing wastes from the nuclear industry.



^{166m}Ho emits a similar pattern of gamma rays and has a long half life, so offers promise as an alternative to ^{226}Ra, which is difficult to obtain and hazardous to handle.

Ionization chambers are used extensively at NMIs and the BIPM for calibrating and comparing radionuclide standards.

A specialist detector system is under construction to ensure that parameters are controlled accurately, so that standards of beta-emitting radionuclides can be compared to within 0.1 % for applications in nuclear medicine and environmental monitoring.



The SIRTI instrument was used for the first time to measure standards of ^{64}Cu and ^{11}C, short-lived radionuclides used for medical imaging.

Researchers at NMIs are working with the BIPM to address key issues in the field