Report of other BIPM activities in the field of radionuclide measurements

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1. Implementation of the triple-to-double coincidence ratio method (TDCR)

After the relocation of part of the laboratory, the TDCR facilities have been reinstalled. Three identical, robust preamplifiers were designed to replace the Ortec fast preamplifiers which proved to be sensitive to overshoot in the pulses. A similar development was made in the spectroscopic channels to handle the 100 ns signals. Acquisition software for the eleven relevant signals (in PASCAL) and for the processing of the data (in FORTRAN) has also been developed. A series of measurements for different radionuclides has been made with acceptable first results for ^{14}C and ^{99}Tc, promising results for ^{89}Sr but unacceptable results for ^{3}H. The discrepancies are being investigated.

A discriminator incorporating a frequency divider has been designed and built to handle the frequency signal delivered by the TAI (precision of 1 Hz) and to provide the TDCR with a selectable signal ranging from 1 Hz to 100 kHz. A ten-trace oscilloscope has been installed so that the fast and gated signals can be followed in parallel. Three multichannel analysers enable simultaneous setting of the three thresholds. In addition a three-channel voltmeter in NIM™ format has been developed and is now in use. Characterization of these new facilities is in progress.

2. Other primary measurement systems

The scalers for beta, gamma and coincidence counting have been replaced by PC board scalers, driven under LabView. Data acquisition is more transparent and an estimation of the measured activity is now available on-line. A digital coincidence counting system developed by the NPL and the ANSTO is on loan and initial results look promising.

All measurements of time made in the RI section are based on quartz oscillators. Their frequency has been checked by direct comparison with a caesium clock in the time section, in collaboration with P. Moussay of the BIPM Time Section. The maximum observed relative difference with the nominal frequency is 1.5×10^{-5}, a value that should not limit the precision of the activity measurements.