

# Primary Standards of Radioactivity

**All measurements of radioactivity in the UK rely on the primary standards held at NPL. The NPL standards are linked to the international measurement system and provide a route to demonstrate that measurements are accurate, consistent and independent - to support regulatory compliance.**

NPL has the capability to standardise more than 100 radionuclides. The work in this area seeks to enhance this capability, with the aim of providing standards for radionuclides that are finding new applications (for example, in nuclear medicine) and developing new measurement systems to provide additional confidence in the standards.

The work includes:

- Development of a new low-noise amplifier for the absolute counting systems, to improve the accuracy of standardisations of radionuclides that decay by electron capture
- Installation of a new instrument using the 'Triple to Double Coincidence Ratio' method to provide a method to standardise radionuclides difficult by other techniques
- A study of the mathematics of coincidence counting systems with the aim of resolving discrepancies in measurement
- Participation in the international measurement system (see overleaf)

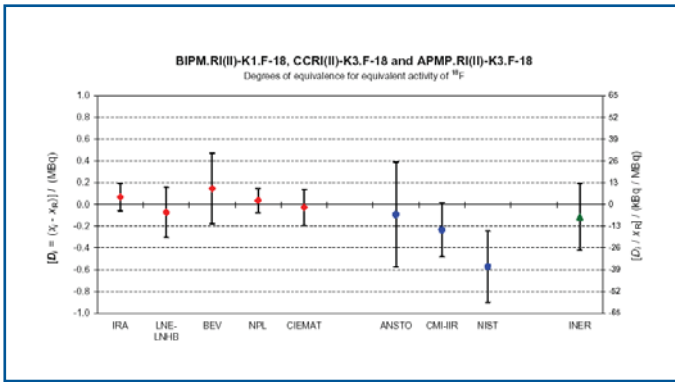
As radionuclide standards decay and primary standardisations are time-consuming, a range of secondary measurement equipment is needed – after calibration with a primary standard, these instruments may be used to measure or produce secondary standards that can be disseminated to



*A typical coincidence counter used to standardise radionuclides (insert shows components of a new amplifier system under development)*

users. Projects in this area include developing a new current measurement system for the ionisation chambers and designing new source positioning systems for the gamma spectrometers to improve accuracy and accommodate new source constructions.

For further information on the Ionising Radiation Programme please visit: <http://www.npl.co.uk/ionrad> or contact one of our experts via e-mail ([radioactivity@npl.co.uk](mailto:radioactivity@npl.co.uk))



Results of primary standardisation of the short-lived radionuclide  $^{18}\text{F}$  submitted to the international reference system (extracted from the BIPM key comparison database at [www.bipm.org](http://www.bipm.org)).

As one of the leading national measurement institutes in the field, NPL supports the work of BIPM through working in partnership with staff from BIPM and other institutes to produce guidance on calculating measurement uncertainties for primary standardisations, developing new measurement equipment to facilitate comparison of primary standards of short lived radionuclides and extending the international reference system to cover pure beta emitters.

NPL hosted the conference of the International Committee for Radionuclide Metrology in 2005.



The BIPM, Paris

### The International Measurement System

NPL is a signatory of the Mutual Recognition Arrangement, an international agreement between National Measurement Institutes concerned with establishing equivalence of primary standards worldwide. Under this agreement, NPL is committed to:

- Participating in (and, in some cases, leading) international comparison exercises of radionuclide standards
- Carrying out a regular programme of primary standardisations to demonstrate capability and submitting samples from these standardisations to the international reference system at the Bureau Internationale de Poids et Mesures (BIPM, Paris)
- Maintaining NPL's accreditation to ISO17025