

Radionuclide Metrology Projects

The SIR for comparing γ -emitting radionuclides

Nuclear medicine: ^{131}I , ^{177}Lu , ^{223}Ra ,...

Environment: ^{137}Cs ,...

Industry: ^{60}Co , ^{152}Eu , ^{237}Np ,...



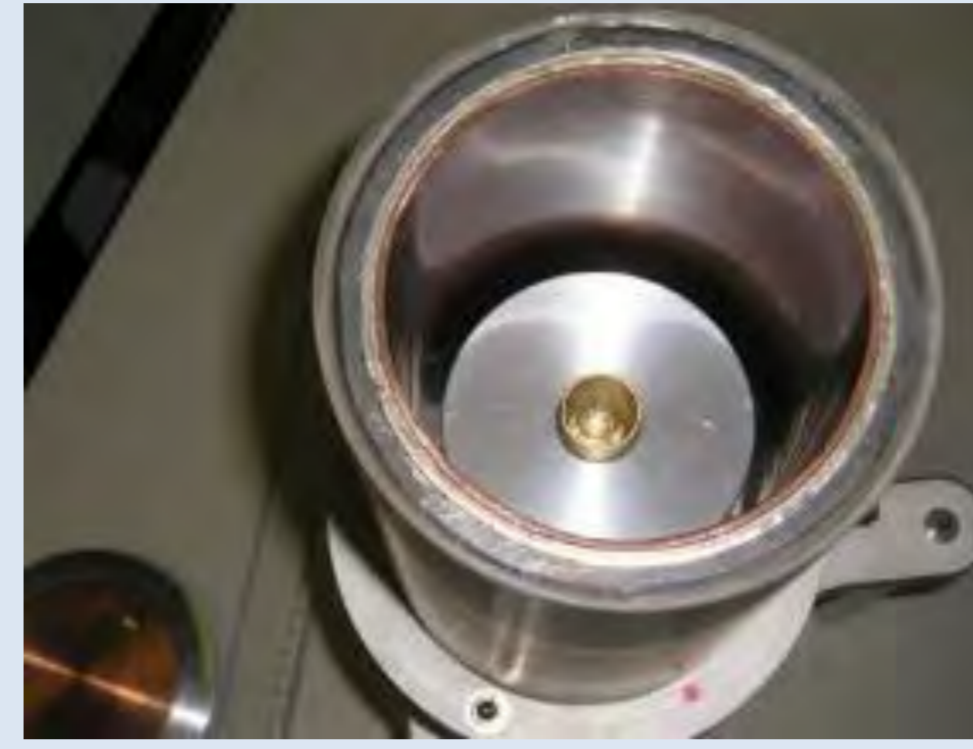
SIR = comparator based on **pressurized ionization chambers** maintained at the BIPM since 1976.

Increased use in 2020-2023:

34 comparisons (+9)
16 NMIs/DIs involved (+5)

The SIR Transfer Instrument for comparing short-lived radionuclides

Mainly nuclear imaging: $^{99\text{m}}\text{Tc}$, ^{18}F , ^{64}Cu ,...



SIRTI = comparator based on ***Nal(Tl) scintillator***, linked to the SIR and travelling to NMIs.

To date, the SIRTI enabled 15 NMIs from 5 RMOs to compare standards of 5 short-lived radionuclides with half-lives from 20 min to 13 h.

Increased use in 2020-2023:

16 comparisons (+4)
6 radionuclides involved (+2)

Automated SIR reports

New database of SIR data and metadata in machine-readable format

New SIR DAQ interface
Comparison results obtained in a few clicks

SIR service more efficient:

- ~30 comparison reports (+24) for 2020-2023
- Report produced within a few month (if NMI data available)

Plans for the future

The SIR is unique as custodian of most activity comparison results for the last 45 years. However, no instrument can last forever so, the **construction of a second SIR** that is better suited to today's safety constraints has started and will use new technology for low current measurement.

Restart of the SIRTI KC programme

SIRTI calibration for more radionuclides

Support of EURAMET laboratories and a secondee from Brazil



NEW: Remote mode to continue comparisons even in case of travelling restrictions (e.g. COVID-19)

First ^{123}I comparison at the KRISS in 2022, a short-lived radionuclide used for thyroid imaging, in remote mode.

Plans for the future

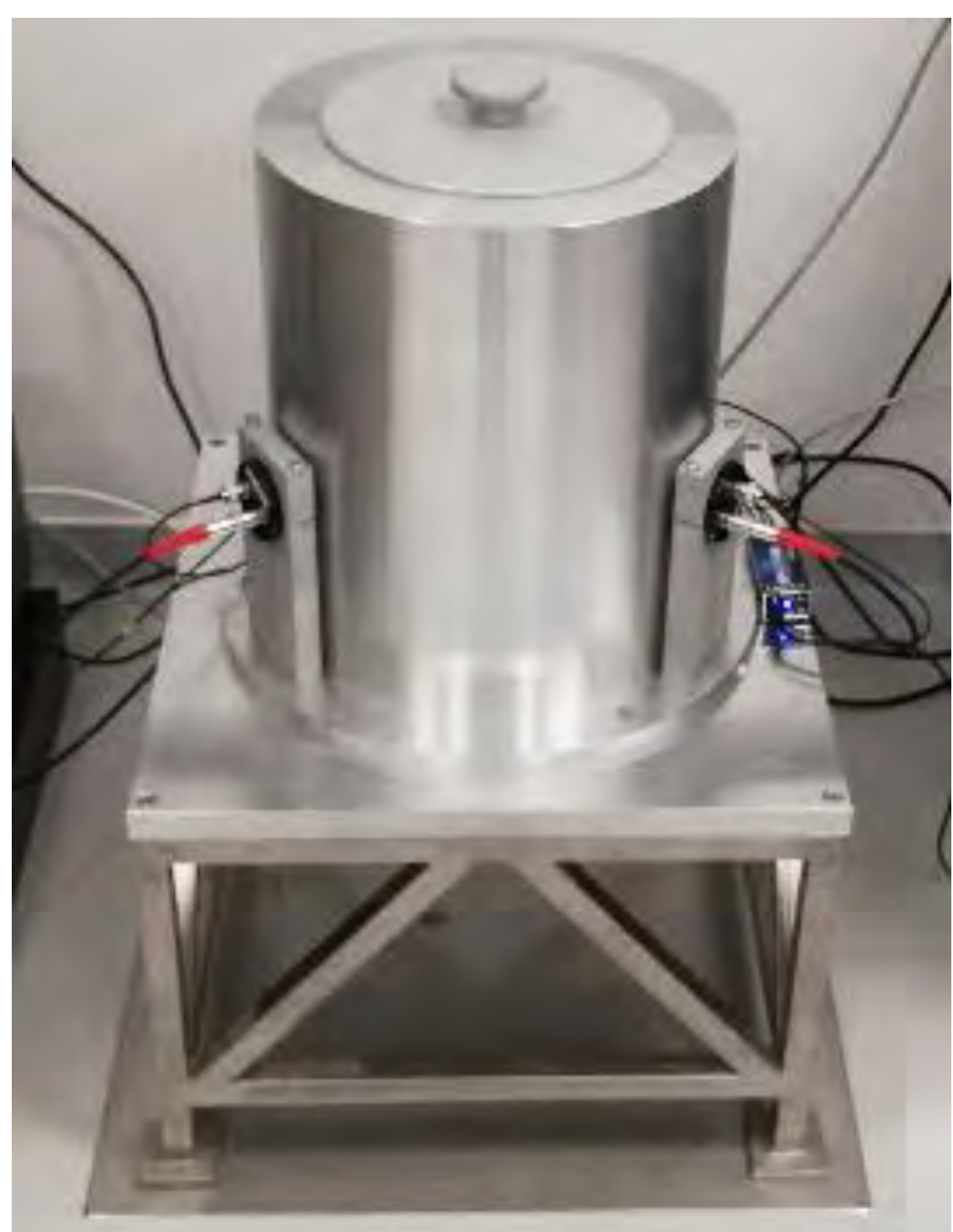
The BIPM is supporting RMOs to develop their own **copy of the SIRTI**. This will enable **more comparisons of short-lived radionuclides** in future.

The Extension of the SIR to β -emitting radionuclides

Nuclear therapy: ^{89}Sr , ^{90}Y , ^{135}La , ^{165}Er ,...

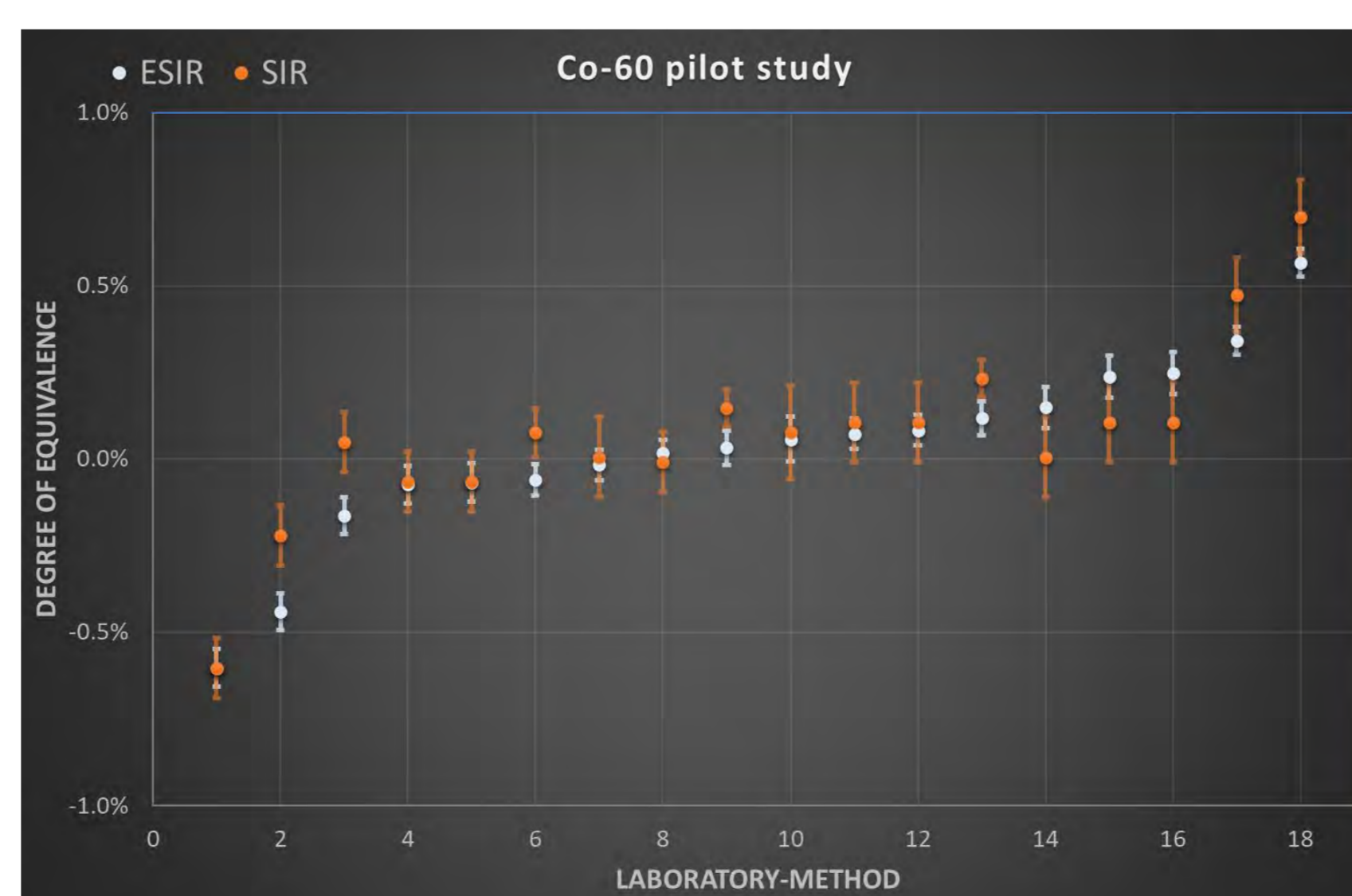
In-vitro diagnostics : ^{32}P , ^{35}S ,...

Environment: ^{210}Po , ^{241}Am ,...



ESIR = comparator based on **liquid scintillation counting**, able to measure **pure β -emitters** not suited for the SIR

Recently tested in a **^{60}Co pilot study** involving 13 NMIs/DIs and showing good agreement with the SIR results.



Plans for the future

It is planned to use this system as an alternative to the SIR for **low energy beta** (e.g. ^{109}Cd) and **pure alpha** (e.g. ^{241}Am) emitters for which the SIR shows certain limitations.