European Metrology Programme
for Innovation and Research

SI Broader Scope - Projects

An overview of the funded projects from the Targeted Programme SI Broader Scope

Precision surface measurements for innovative optics (15SIB01)

Measurement to support innovation in optical aspheres and freeform surfaces

Aspheres and freeform surfaces are used in a variety of optical systems, from medical imaging to astronomy, and deliver better image quality than traditional spherical elements. However, their development is limited by the precision with which their surface can be measured. Following IND10 Form, this project will develop new capabilities to measure below 30 nanometres, enabling industry to attain a new level in optical device performance.

Paving the way for the new kelvin (15SIB02)

New methods to determine a comprehensive and low-uncertainty temperature dataset

Ahead of the redefinition of the kelvin in terms of the Boltzmann constant in 2018, a robust dataset is required that details deviations between temperatures founded on the current rather than the new definition. Following SIB01 InK, this project will develop new methods to complete the remaining gaps in knowledge required to establish a comprehensive low-uncertainty dataset, ensuring the redefinition is achieved and disseminated effectively.

Unlocking the potential of next-generation clocks (15SIB03)

High-accuracy time measurement for optical atomic clocks

The second is currently best realised using caesium atomic clocks, but optical atomic clocks can measure time with even greater accuracy. Following SIB55 ITOC, this project will develop techniques that can verify accuracy to one billionth of a billionth of a second and validate the performance of these optical clocks, supporting their potential use in applications from the redefinition of the second, to the search for dark matter, to satellite navigation.

Bringing traceability to AC measurements (15SIB04)

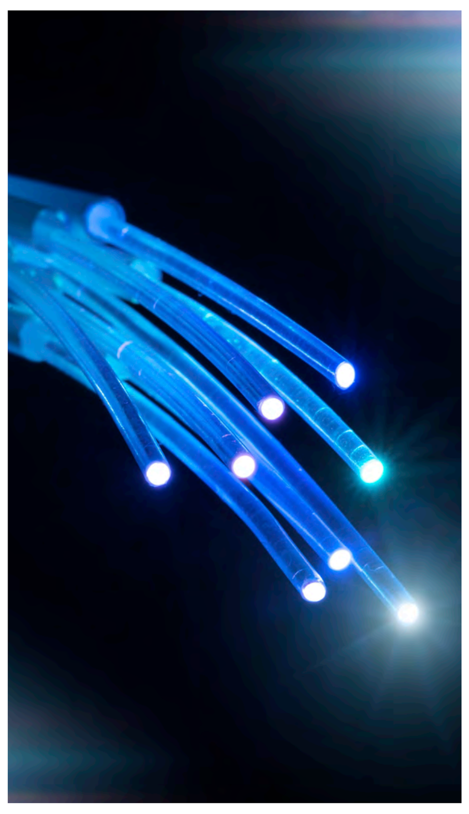
Developing AC voltage measurement systems for industrial end-users

Although voltage measurements made from direct currents (DC) can be traced back reliably to the standard SI volt, to ensure universal consistency, measurements made from alternating currents (AC) cannot. This project will develop reliable, easy-to-use AC voltage measurement systems that can be traced to the standard volt, enabling industry to develop previously unachievable products that rely on fast analogue-to-digital conversion.

Comparing next-generation clocks through optical fibres (15SIB05)

Building a European optical fibre network for comparing optical atomic clocks

Clocks in different locations need to be regularly compared to reveal and reduce uncertainty, but the satellite-based techniques currently used are not precise enough for the next generation of atomic clocks, optical clocks. Following SIB02 NEAT-FT, this project will develop high-accuracy comparison techniques for optical clocks based on optical fibres, paving the way for improvements in precision timekeeping in fields such as communications and finance.



EURAMET e.V. -
the European Association of National Metrology Institutes

The European Metrology Programme for Innovation and Research (EMPIR) follows on from the successful European Metrology Research Programme (EMRP), both implemented by EURAMET. The programmes are jointly funded by the participating countries and the European Union and have a joint budget of over 1000 M€ for calls between 2009 and 2020.
EURAMET e.V. is a non-profit organisation under German Law.

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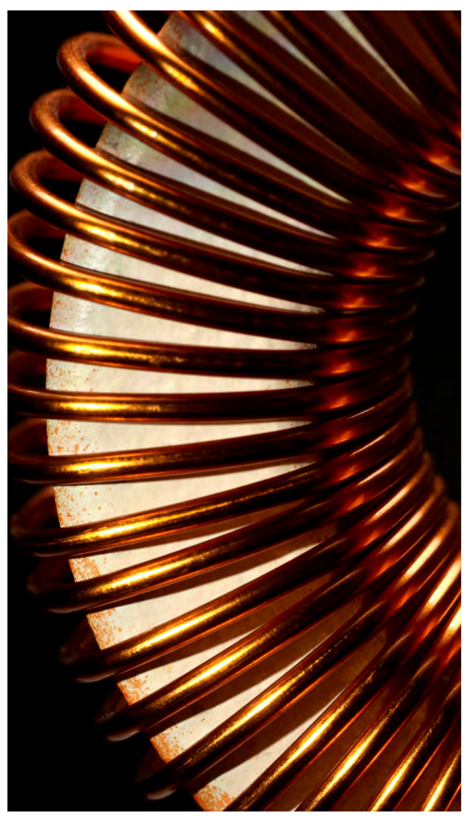
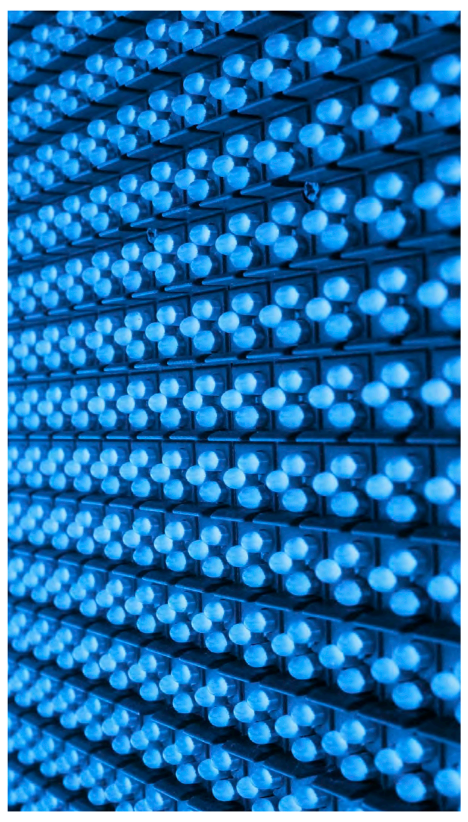
Measuring magnetic fields at the nanoscale (15SIB06)



Accurate and traceable measurement capabilities for micro and nanoscale magnetic field measurement

The development of smaller, higher-performance electronic devices demands the measurement of magnetic fields on ever smaller scales. Following EXL04 SpinCal, this project will extend the accurate and traceable measurement of magnetic fields to micrometre and nanometre scales, allowing industrial users in fields including computing, magnetic sensing and biomedicine to measure and manipulate fields with previously unattainable levels of precision.

Increasing confidence in energy efficient lighting (15SIB07)



Developing LED-based standard lamps for solid-state light calibration

Solid-state lighting, which uses light-emitting diodes (LEDs), is globally replacing traditional incandescent lighting, due to lower power consumption and greater durability. This project will develop new standard lamps based on LEDs and new measurement techniques for assessing the performance of solid-state lights, resulting in a more reliable classification of their energy efficiency and increasing consumer confidence in this new technology.

Precision control of single electrons (15SIB08)

Using single-electron sources to define and measure the new ampere

In the proposed 2018 redefinition, the ampere will be based on the value of the elementary charge and methods are needed that can accurately generate an electric current by controlling the flow of individual electrons - one such method is to use single-electron sources. Following SIB07 Qu-Ampere, this project will develop capabilities to fabricate, test and validate single-electron sources, to support the redefinition and ensure consistent measurements in industry.

3D measurements for advanced nanotechnology (15SIB09)

Metrology for accurate and traceable nanoscale 3D measurement

The demand for smaller, higher-performance electronic devices requires the development of increasingly sophisticated nanoscale components. Following NEW01 TReND, this project will develop scanning probe microscopy-based techniques, traceable to reference measures, to measure nanoscale objects in three dimensions, supporting the development of high-performance devices in fields as diverse as medicine, energy capture and storage and space exploration.

Understanding beta radiation from radionuclides (15SIB10)

Metrology for the accurate measurement of radionuclide beta spectra

Radionuclides that release beta radiation are used in a range of applications, from medical diagnosis to nuclear power management, but techniques to measure the precise energy levels, or spectra, of beta radiation are not sufficiently accurate. This project will develop theoretical and experimental approaches to measure the spectra of beta radiation to an unprecedented level of accuracy, supporting the more effective use of radionuclides.

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The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States