

# European Metrology Research Programme



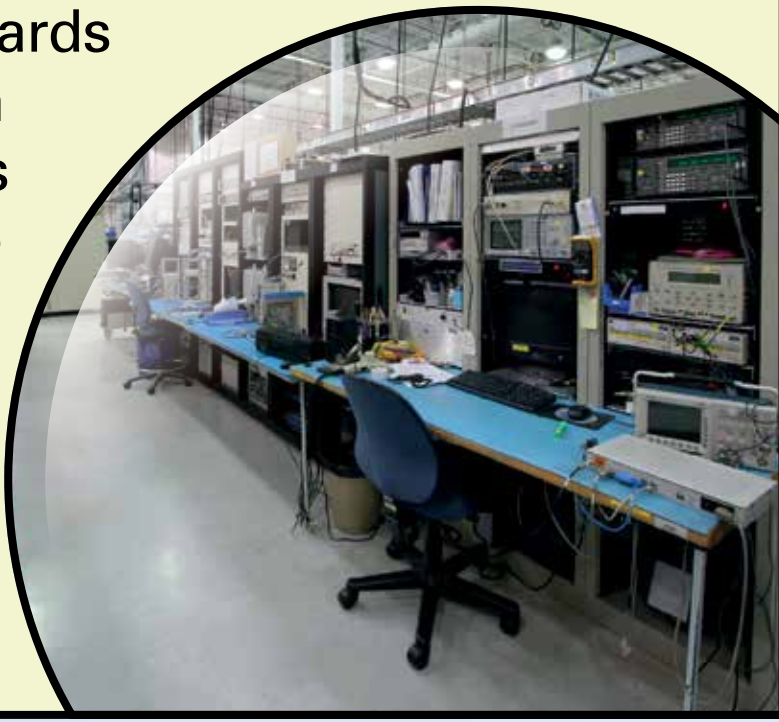
## SI Broader Scope II

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

### Portable quantum resistance standards

Quantum resistance metrology based on graphene (SIB51)

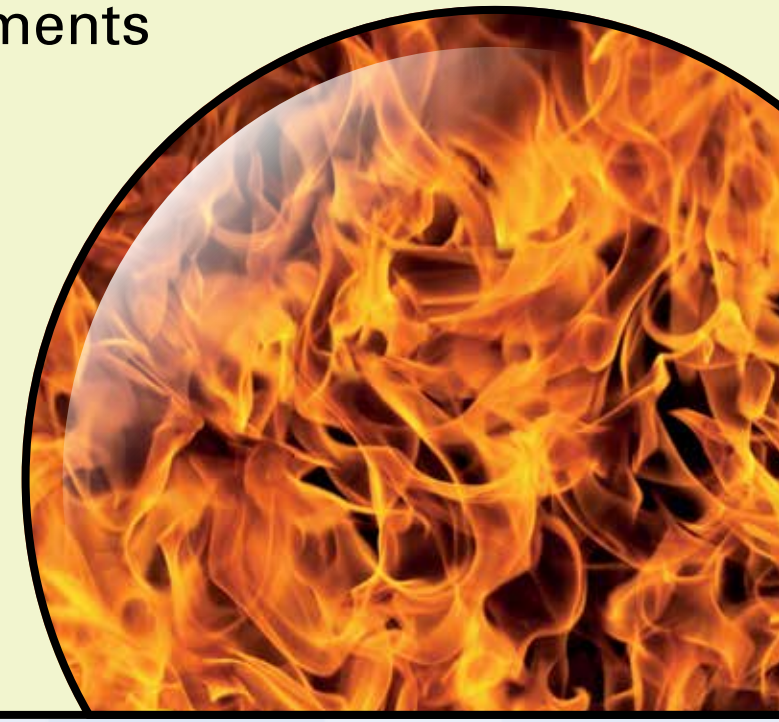
Quantum electrical voltage standards are widely available but quantum resistance standards are not. This project will build stable graphene devices that can operate in relaxed conditions for use as quantum resistance standards for the electricity community.



### Thermal protection for industry

Metrology for thermal protection materials (SIB52)

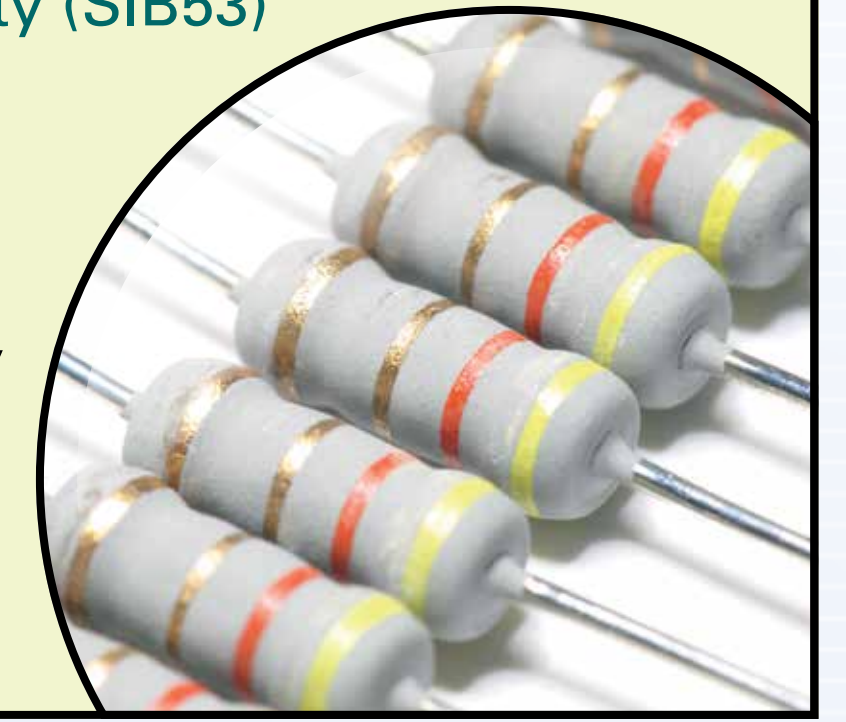
Thermal conductivity measurements can produce scatter of over 100 % for new thermal protection materials. This project will improve measurements up to 800 °C for designers of fire engineering and safety systems to select the best materials.



### Impedance measurements for electrical components

Automated impedance metrology extending the quantum toolbox for electricity (SIB53)

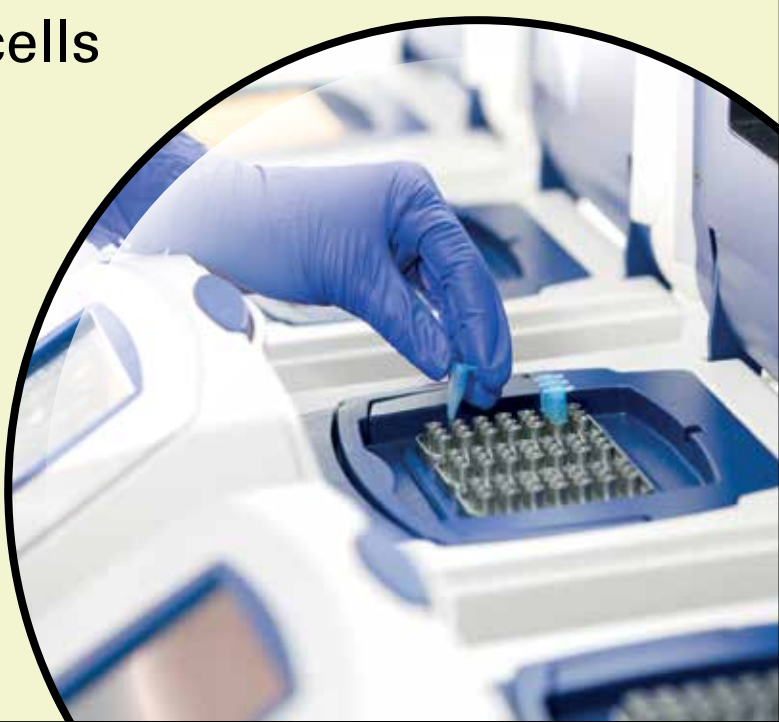
Electrical impedance is used in many applications, from touchscreens to radiation measurement. This project will bring down calibration costs by replacing multiple individual impedance standards with a novel programmable impedance simulator.



### Better biological measurements

Traceability for biologically relevant molecules and entities (SIB54)

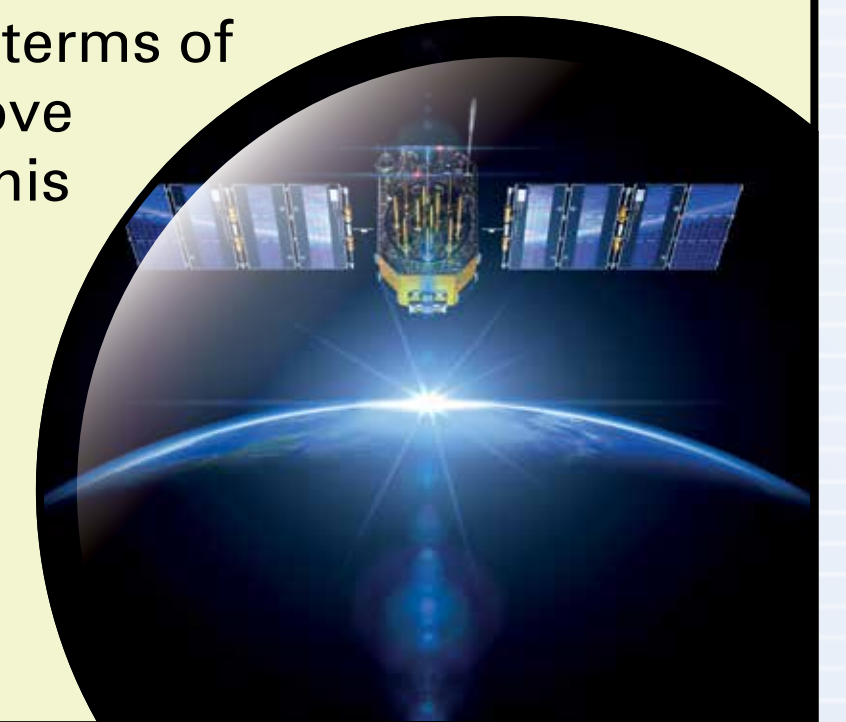
Accurate counting of DNA and cells is vital for security, healthcare and food. This project will bring traceable measurement to biology, focusing on monitoring for minimal residual disease to determine the success of medical treatments.



### Preparing for a new second

International timescales with optical clocks (SIB55)

A redefinition of the second in terms of an optical frequency will improve the accuracy of time signals. This project will help prepare for this redefinition by improving clock comparisons and benefit scientific space missions.



### The airborne watt

Realisation, dissemination and application of the unit watt in airborne sound (SIB56)

A variety of procedures are used to measure sound power, leading to large uncertainties. This project will establish traceable measurements and develop a primary standard to realise the watt unit in airborne sound.



### Light detection

New primary standards and traceability for radiometry (SIB57)

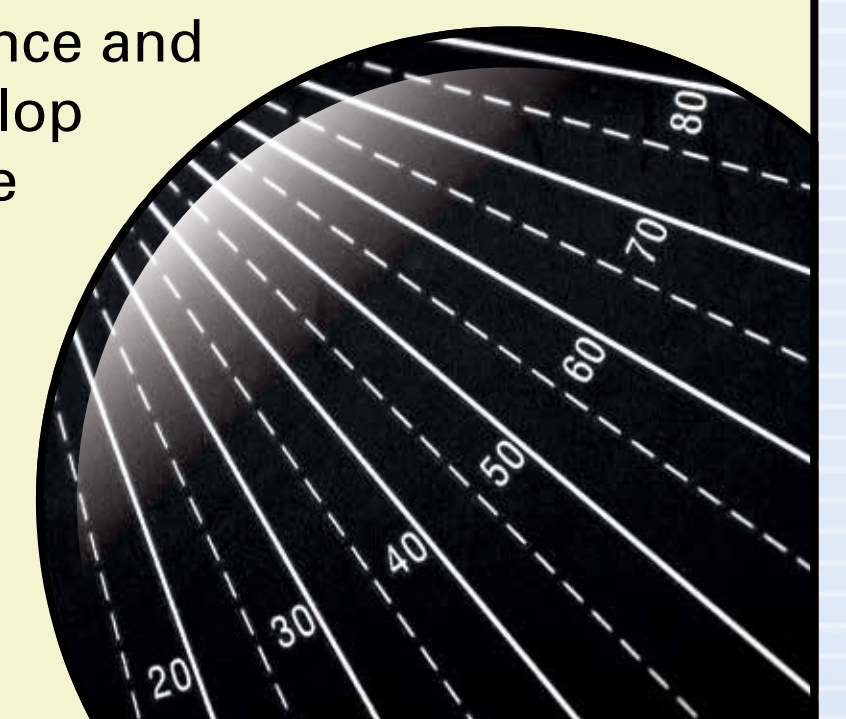
More efficient light-detecting instruments, known as photometers, are needed for use in products such as smart imaging and diagnostic devices. This project will improve these instruments, resulting in the highest level realisations of the radiometric units.



### New angles

Angle metrology (SIB58)

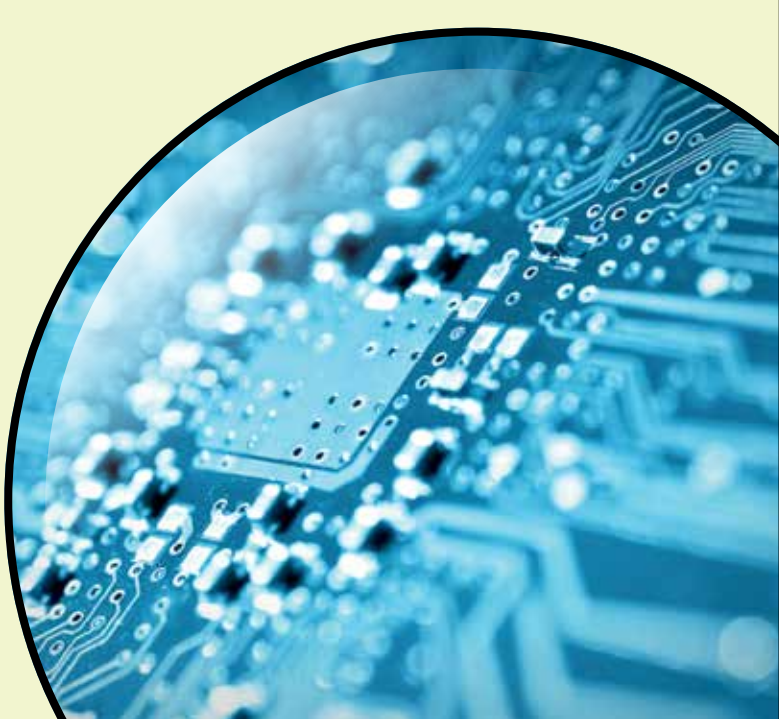
Improved angle measuring devices and calibration are needed for science and industry. This project will develop prototype devices to realise the radian, the SI unit of angle, to ensure reliable angle measurement.



### Electrical traceability

A quantum standard for sampled electrical measurements (SIB59)

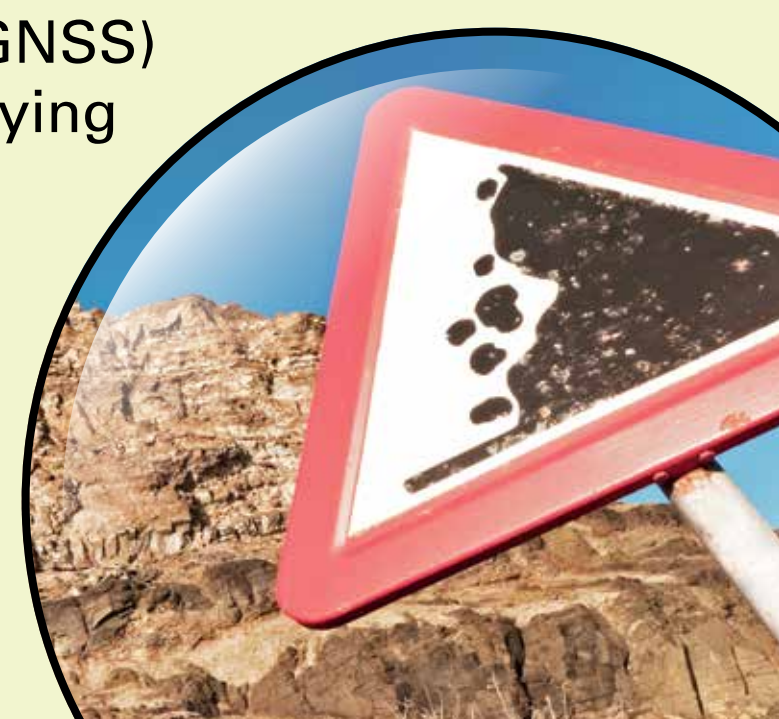
New electrical products need analogue-to-digital converters with increased sampling rates. This project will develop a measurement system for the dynamic calibration of the latest generation of converters for the electronic sensing sector.



### Large measurements over long distances

Metrology for long distance surveying (SIB60)

Optical distance measurement and Global Navigation Satellite Systems (GNSS) are used in long distance surveying for tasks such as assessing the risk of landslides. This project will develop optical devices and improve knowledge of uncertainty for GNSS.



### Nanoscale length measurement

Crystalline surfaces, and self assembled structures, and nano-origami as length standards in (nano)metrology (SIB61)

Nanoscale length measurement standards are currently limited by the technology that produces them. This project will develop new types of standard to surpass these limits, for the traceable measurement of nanoparticles and carbon nanotubes.



### New measurements for emerging electronics

Metrology for new electrical measurement quantities in high-frequency circuits (SIB62)

A lack of traceable measurements is holding back cutting-edge industrial electronics that operate in the radio frequency, microwave and millimetre-wave areas. This project will develop traceable verification techniques to benefit these systems.



### Better measurements of larger forces

Force traceability within the meganewton range (SIB63)

There is increasing demand for the measurement of large forces of up to 30 MN. This project will extend the range of primary force standards up to at least this level to improve engineering measurement accuracy.



### Moisture in materials

Metrology for moisture in materials (SIB64)

Maintaining correct moisture levels in products such as foods and pharmaceuticals is vital to ensure quality and reduce waste. This project will reduce ambiguity in current moisture measurements, helping science and industry measure moisture more accurately.



Europe's National Measurement Institutes working together

The European Association of National Metrology Institutes (EURAMET) has implemented the European Metrology Research Programme (EMRP), a programme with a value of over 400 M€, organised by 23 NMIs and supported by the European Union.

Full details can be found at: [www.euramet.org](http://www.euramet.org)

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**EMRP**  
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