Consultative Committee for Electricity and Magnetism
CCEM

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Main Metrological Areas

- Electrical quantities at dc and low frequencies
- Electrical quantities at radio and microwave frequencies
- Quantum standards
- Electromagnetic fields
- Magnetic flux and magnetic field strength
- Dielectrics and properties of dielectric materials
Activities and achievements since the last CGPM

• Preparation of a *mise en pratique* for the electrical units
• Task Group established to consider implication for end users of expected $1 \times 10^{-7}$ change for the volt. Led to presentations at NCSLI and CPEM conferences in 2014 plus publication
• Regular review of key comparisons and CMC work-load
• Recommendation on simplification of CMC presentation to reduce the number of CCEM CMC entries in the database
• Increased cooperation between RMOs to reduce duplication in the reviewing of CMCs
• Agreement with RMOs on shorter deadlines for CMC review
• Preparation of CCEM strategy document
Areas of Priority

• Support for the SI re-definitions
  • Management of the expected change of the magnitude of the volt (1 x 10⁻⁷)

• Support for the Watt Balance
  • Development of an affordable, easy-to-use, reliable watt balance

• Making quantum standards more versatile
  • Travelling ac Josephson voltage standard, simpler QHR systems, ac QHR as impedance standard

• BIPM Key Comparisons

• Effective and efficient processing of Key Comparisons and CMCs

• Facilitation of collaboration between the NMIs of Member States

• Strategic planning to address the demands of new and emerging technologies
**Inter-disciplinary Issues**

- Measurements and standards for nano-systems
  - Nano-bioelectronics
  - Molecular electronics
  - Nano-magnetism
  - Carbon nanotubes
- New materials
  - graphene
- THz metrology
- Physiological effects of electromagnetic fields
  - Magnetic resonance imaging
  - Cell phones
  - Power transmission lines
• Reducing the workload related to the CIPM MRA in a field with many derived quantities, often extending over a large range of values, by the design of efficient Key Comparisons and delegation to the regions to run further Key and Supplementary Comparisons according to need.

• Development of new travelling quantum standards to enable comparisons at the highest levels of accuracy.

• Support technological developments in electrical instrumentation by making quantum standards more versatile and more widely available

• Support electrical measurement in important new fields such as power metrology and THz metrology.

• Collaboration in the development and comparison of electrical standards for nano-structures?