Revision of the SI

Momentum is building towards the historic revision of the International System of Units (the SI), which is expected to be approved at the 26th General Conference on Weights and Measures (CGPM) in Versailles in November 2018. The revision will mark the culmination of many years of work by the international metrology community. Formal approval to go ahead was granted by the CIPM, which agreed at its meeting on 20 October 2017 to recommend to the CGPM that it proceed in 2018 with the expected redefinition of four base units of the SI.

In January 2018, the CIPM Task Group for Promotion of the SI met at the BIPM to continue its work to identify and develop key tools to support all Member States to promote the revised SI among a wide range of audiences. The messages and tools that the Task Group develops will be made available for Member States to use and will be shared through its dedicated web page.

The changes to the SI will base it on a set of definitions each linked to the laws of physics, thus eliminating the final link between the SI and definitions based on physical artefacts. Following the revisions, the kilogram will be linked to the exact value of the Planck constant rather than the International Prototype of the Kilogram, as sanctioned by the 1st CGPM in 1889. The values of the constants that will be used to redefine the SI have been published in Metrologia. Many important results were submitted to Metrologia ahead of the 1 July 2017 deadline set by the CIPM for new experimental results to be received and accepted for publication. This was in order for them to be considered in the special 2017 adjustment of the fundamental constants. The CODATA Task Group on Fundamental Constants carried out the special least-squares adjustment requested by the 24th CGPM (2011), and the results were published on schedule. (See: Decision CIPM/2017-10 and The CODATA 2017 values of $h$, $e$, $k$, and $N_A$ for the revision of the SI).[15]

“...The decision by the CIPM to propose a resolution to the 26th CGPM on the redefinition of the base units in the SI brings the vision of an International System of Units based on invariant constants of nature one step closer to realization. In taking this decision, the CIPM acknowledges the outstanding contributions by many metrologists and the commitments of their institutes to undertake the long-term experiments necessary to make this decision possible.”

Dr Barry Inglis, President of the CIPM

The BIPM organized a scientific symposium “The fundamental constants of physics: what are they and what is their role in redefining the SI” on 7 September 2017, under the auspices of the Consultative Committee for Units (CCU). The symposium celebrated the work accomplished towards the proposed revision of the SI and included a distinguished line-up of invited speakers who gave the following lectures:

- Dr Gilles Cohen-Tannoudji Lambda, the fifth fundamental constant considered by Einstein.
- Prof. Klaus von Klitzing (Nobel laureate) The quantum Hall effect and the new SI.
- Prof. Jean Marc Lévy-Leblond Variations on the Planck constant.
- Dr Terry Quinn (Emeritus Director, BIPM) From Artefacts to Atoms – at last!
- Dr Jean-Philippe Uzan Fundamental constants, gravitation and cosmology.
- Prof. Gabriele Veneziano Fundamental strings and fundamental constants.

Keep up to date with the revision of the SI...

The SI is not static but evolves to match the increasingly demanding requirements for measurements globally. The latest information about the revision of the SI can be found on the BIPM website: www.bipm.org/en/measurement-units/new-si/