

The Quantum Revolution in Metrology

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On World Metrology Day 2019 (May 20, 2019), all countries in the world changed the definitions for the following base units of the International System of Units (SI system): the kilogram, the ampere, the kelvin and the mole. In an historic vote, the General Conference on Weights and Measures, which represents 98% of the world gross product, decided this change unanimously. This decision means that all SI units will now be defined in terms of constants of nature [1]. This change was optimized in such a way, that nearly nothing happened in our daily life but in the field of high precision electrical measurements, some adjustments were necessary.

The quantized Hall resistance (Nobel Prize 1985) played a crucial role for the realization of this new SI system since this quantum resistance can be used not only for high precision measurements of electrical standards but also for a new realization of a kilogram by comparing electrical and mechanical forces with the Kibble balance.

References

[1] see: <https://www.bipm.org/en/measurement-units>