Representation of the ohm by means of the quantum Hall effect

RECOMMENDATION 2 (CI-1988)

The Comité International des Poids et Mesures,

acting in accordance with instructions given in Resolution 6 of the 18th Conférence Générale des Poids et Mesures concerning the forthcoming adjustment of the representations of the volt and the ohm,

considering

— that most existing laboratory reference standards of resistance change significantly with time,
— that a laboratory reference standard of resistance based on the quantum Hall effect would be stable and reproducible,
— that a detailed study of the results of the most recent determinations leads to a value of 25 812.807 Ω for the von Klitzing constant, $R_K$, that is to say, for the quotient of the Hall potential difference divided by current corresponding to the plateau $i = 1$ in the quantum Hall effect,
— that the quantum Hall effect, together with this value of $R_K$, can be used to establish a reference standard of resistance having a one-standard-deviation uncertainty with respect to the ohm estimated to be 2 parts in $10^7$, and a reproducibility which is significantly better,

recommends

— that 25 812.807 Ω exactly be adopted as a conventional value, denoted by $R_{K,90}$, for the von Klitzing constant $R_K$,
— that this value be used from 1st January 1990, and not before, by all laboratories which base their measurements of resistance on the quantum Hall effect,
— that from this same date all other laboratories adjust the value of their laboratory reference standards to agree with $R_{K,90}$,
— that in the use of the quantum Hall effect to establish a laboratory reference standard of resistance, laboratories follow the most recent edition of the technical guidelines for reliable measurements of the quantized Hall resistance drawn up by the Comité Consultatif d'Électricité and published by the Bureau International des Poids et Mesures,

and is of the opinion

— that no change in this recommended value of the von Klitzing constant will be necessary in the foreseeable future.