

Josephson Voltage Standard Comparison Automation

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Abstract - To ensure the uniformity of the representation of the volt based on KJ-90, a series of key comparisons have been carried out by the Bureau International des Poids et Mesures (BIPM) under the auspices of the Consultative Committee for Electricity and Magnetism (CCEM) using the BIPM.EM.K10 Technical Protocols Option A and Option B for the Josephson Voltage Standards (JVS) operated by National Metrology Institutes (NMI) around the world. These JVS comparisons are manually operated. Comparisons of this type can also be performed using the automatic protocol that was developed recently. The automatic protocol improves the comparison through the modification of the bias electronics and automation. This paper will present the principal for the automation and its practical realization. Examples detailing the actual usage of the automatic protocol by the Key Comparison, Regional Metrology Organization (RMO), and the National Conference of Standards Laboratories International (NCSLI) will also be presented. The uncertainty of the JVS comparison using the automatic protocol is comparable with that listed in the Key Comparison Data Base (KCDB).

Keywords - automation; Josephson voltage standard; comparison protocols; uncertainty

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