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Companion guide to the revised technical guidelines for reliable dc measurements of the quantized Hall resistance for graphene-based devices

Original

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






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Companion guide to the revised technical guidelines for reliable dc measurements of the quantized Hall resistance for graphene-based devices

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Abstract

This companion guide revises and expands upon the established technical guidelines for reliable direct current measurements of the quantized Hall resistance, adapting them to the unique characteristics of epitaxial graphene. Graphene has emerged as a viable alternative to traditional Gallium Arsenide heterostructures for metrological applications due to its relaxed operating conditions. These less demanding requirements facilitate the use of low-cost, compact cryomagnet platforms, which is expected to broaden the deployment of primary resistance standards to National Metrology Institutes and other laboratories with limited resources. The guide explores the specific challenges and considerations of epitaxial graphene devices, including aspects of device choice, cooling and handling, contact resistance, conditions of quantization, and general measurements of the quantized Hall resistance. The presented details should assist those seeking to conduct rigorous characterization procedures to verify device integrity, ultimately contributing to a global effort to formally accept graphene-based devices as reliable primary resistance standards.

Full paper

The full paper is available online at: <https://metrologia.bipm.org/guides-stds-conventions/2026/G1.pdf>.

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