The EMPIR Project MEMQuD, towards a Quantum Conductance standard based on Atom Point Contact Devices

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Memristive devices (electrical resistance switches) that couple ionics (i.e. dynamics of ions) with electronics offer a promising platform to observe quantum effects in air, at room temperature, and without an applied magnetic field. For this reason, they can be traced to fundamental physics constants fixed in the revised SI for the realisation of a standard of resistance. However, as an emerging technology, memristive devices lack standardization and insights in the fundamental physics underlying its working principles, hindering their use. The overall aim of the project is to investigate and exploit quantized conductance effects in memristive devices for the realization of quantum-based standards of resistance that operate reliably, in air and at room temperature with scalability down to nanometer precision. In particular, the project will focus on the development of memristive model systems and nanometrological characterization techniques at the nanoscale level in memristive devices, in order to better understand and control the quantized effects in memristive devices. Such an outcome would enable the realization of a standard of resistance implementable on-chip for self-calibrating systems with zero-chain traceability in accordance with the revised SI.