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Physikalisches Kolloquium
Einladung

Physics Colloquium
Invitation

Monday, 13 November 2023

Lecture Hall N24/H13, at 16:15
Coffee and cookies will be served in front of the lecture hall from 16:00

Single Electron Pumps for the Revised Ampere

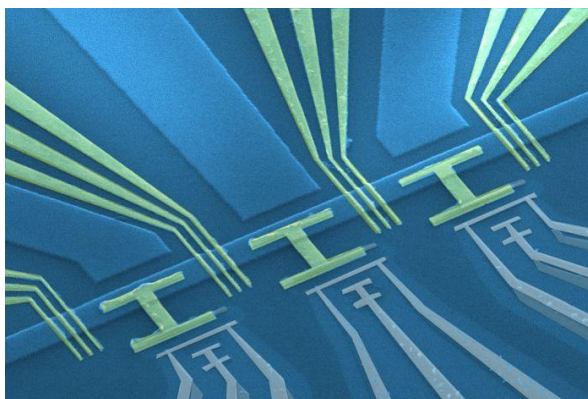
Prof. Dr. Hans Werner Schumacher

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 www.ptb.de



On May 20th, 2019, the revised International System of Units (the SI) entered into force. Since then, the SI base units are defined by fixed values of a set of fundamental constants, among them the Planck constant h and the elementary charge e . A direct primary standard for the electrical base unit ampere could now be realized by so-called single electron pumps. They are based on single electron transistors that are driven by an oscillating gate voltage with frequency f . During one oscillation cycle one electron is first captured from source and later ejected to drain thereby generating a quantized current $I = ef$. In my talk, I will review the present state of single electron pumps for the direct representation of the ampere. I will show that semiconductor-based single electron pumps are excellent candidates for primary current standards allowing high enough currents in combination with excellent quantization accuracy. I will further discuss in-situ measurements of pump errors by single charge detection and I will give a short outlook on further prospects of single electron pumps like the generation of shot noise free currents or the field of single electron quantum optics.



Host: Prof. Dr. Fedor Jelezko, Institute of Quantum Optics

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