Aalto University

Dissertation press release 2.1.2020

Delivering electrons one by one

Title of the dissertation	Optimization of Quantum Pumps
Contents of the dissertation	Electron pumping is a process of capturing and releasing electrons periodically. Fast and accurate on-demand single-electron delivery is crucial for nanoelectronics and quantum current standard realization. On May 20, 2019, the definition of ampere was officially changed. The new quantum ampere is defined using the elementary charge and the caesium frequency standard. Recent developments in quantum technology and nano-device fabrication have already enabled single-electron pumping with close-to-metrological accuracy. One more order of magnitude improvement in accuracy is needed. Optimization of a quantum pump implies a recipe with a control protocol that allows for extremely accurate and fast capture and release of a quantum particle. In this dissertation, I propose the optimal operating conditions for an experimentally available tunable-barrier single-electron pump.
Field of the dissertation	Applied Physics, Condensed Matter.
Doctoral candidate	Elina Potanina, M.Sc.
Time of the defence	17.01.2020 at 13:00
Place of the defence	Aalto University School of Science, lecture hall M1, Otakaari 1, Espoo
Opponent	Professor Peter Samuelsson, Lund University, Sweden
Custos	Professor Christian Flindt, Aalto University School of Science, Department of Applied Physics
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