Universität Basel

Research Project

Coupling a single trapped ion to a nanomechanical oscillator

Third-party funded project

Project title Coupling a single trapped ion to a nanomechanical oscillator
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Organisation / Research unit
Departement Chemie / Chemische Physik (Willitsch)
Department
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We propose to couple for the first time a cold ion in an ion trap to a nanomechanical oscillator consisting of metallic nanowire, establishing a new type of quantum interface between a single atom and a solid-state device. We will realize resonant coupling between the two systems mediated by electric fields and will use the nanowire to manipulate the quantum motion of the ion. The present project stands right at the interface between quantum science, quantum optics and nanoscience and will introduce nano-techniques into quantum optics in a new and original fashion. The present proposal is laid out as a collaboration between the Willitsch and Poggio groups, combining the complementary expertise of both groups in a highly interdisciplinary project. The results of the present project open up perspectives for a new research direction, i.e., ion-solid state interfaces, with potential applications in fields as diverse as quantum technology, the nanosciences, mass spectrometry and chemical sensing.

Keywords cold ions, nanoscience, nanoscillator, quantum sensing, quantum technologies
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