# TOWARDS INTERFACING TRAPPED CHARGED PARTICLES WITH QUANTUM CIRCUITS

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I will discuss strategies to interface the motion of trapped charged particles with superconducting circuits. Conceptually the biggest hurdles towards such hybrid quantum systems appear to be a vast impedance mismatch as well as frequency gap between the motional dipoles of ions and electrons on one side and the typical electronic quantum circuits on the other side. In the first part of the talk, I will discuss means on how to address the frequency gap with a parametric upconversion scheme without inducing significant additional decoherence.

In the second part of the talk, I will discuss experiments aiming at understanding the interaction of ultra-cold ions with electric circuits. These experiments will highlight the role of impedance mismatch and thus can yield important information on mitigating the impedance mismatch problem and thus on the design criteria for hybrid interfaces.

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