Strong-Coupling Logic of Trapped Ions

Abstract

Quantum gates are the building blocks of quantum computers. In trapped-ion systems these gates are typically implemented in the weak coupling regime of laser-ion interaction to maintain the controllability and fidelity of the gates. This in turn would result in slow gates. In the strong-coupling regime the gates can be implemented much faster, however in this regime the system is no longer described by a linear interaction and therefore it is not easily controllable. In this talk, I will present an approach for controlling the system and implementation of the quantum gates in the nonlinear strong-coupling regime.