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Development of X-junctions and robust transport protocols for an ion-trap based quantum computer

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One of the challenges of ion-trap based quantum computers is their scalability. With an increasing number of qubits and parallelization of computation junctions and ion transport become necessary. A surface quantum charged coupled device architecture is a promising approach to tackle this challenge. Storage registers are needed for temporarily storing ions inbetween excecuting individual gate operations.
We report on the development of an X-junction and on our current X-junction design. Additionally, we show results of the development of ion transport protocols for implementing robust and reproducible ion transport for our surface-electrode trap chip.

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