Quantum Physics

High fidelity transport of trapped-ion qubits through an X-junction trap array

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We report reliable transport of 9Be+ ions through a 2-D trap array that includes a separate loading/reservoir zone and an "X-junction". During transport the ion's kinetic energy in its local well increases by only a few motional quanta and internal-state coherences are preserved. We also examine two sources of energy gain during transport: a particular radio-frequency (RF) noise heating mechanism and digital sampling noise. Such studies are important to achieve scaling in a trapped-ion quantum information processor.

Comments: 4 pages, 3 figures Updated to reduce manuscript to four pages. Some non-essential information was removed, including some waveform information and more detailed information on the trap

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