

Abstract Submitted
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Aberration in Ion Optics to Focus Magneto-Optically Trapped Single Ions for a Silicon Quantum Computer¹ JINMING ZHANG, WILLIAM FAIRBANK, SIU AU LEE, Colorado State University — The scalable Si-based quantum computer proposed by B. Kane requires precise placement of P-31 atoms 20nm apart and 10nm below the surface in a pure Si-28 substrate. To accomplish that, a scheme based on laser-cooled single Si-31 atom in a Magneto-Optical Trap (MOT) has been proposed. As part of this scheme, a single trapped Si-31 atom must be resonantly ionized and focused on the substrate with relatively low energy (100eV). Spherical aberration is the main limitation associated with focusing the single ions to ~ 1 nm precision. The coefficient of spherical aberration has been determined for a promising design by varying the initial conditions of the ion beam.

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