

Abstract Submitted
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Development of Linear Mode Detection for Top-down Ion Implantation of Low Energy Sb Donors JOSE PACHECO, MEENAKSHI SINGH, EDWARD BIELEJEC, MICHAEL LILLY, MALCOLM CARROLL, Sandia Natl Labs — Fabrication of donor spin qubits for quantum computing applications requires deterministic control over the number of implanted donors and the spatial accuracy to within which these can be placed. We present an ion implantation and detection technique that allows us to deterministically implant a single Sb ion (donor) with a resulting volumetric distribution of <10 nm. This donor distribution is accomplished by implanting 30keV Sb into Si which yields a longitudinal straggle of <10 nm and combined with a <50 nm spot size using the Sandia NanoImplanter (nI). The ion beam induced charge signal is collected using a MOS detector that is integrated with a Si quantum dot for transport measurements. This work was performed, in part, at the Center for Integrated Nanotechnologies, a U.S. DOE Office of Basic Energy Sciences user facility. The work was supported by Sandia National Laboratories Directed Research and Development Program. Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a Lockheed-Martin Company, for the U. S. Department of Energy under Contract No. DE-AC04-94AL85000.

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