

Abstract Submitted
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Role of metastable charge states in a quantum-dot spin-qubit readout¹ JEFFREY MASON, University of Waterloo, SERGEI STUDENIKIN, ALICIA KAM, ZBIG WASILEWSKI, ANDREW SACHRAJDA, National Research Council Canada, JAN KYCIA, University of Waterloo — Readout of a singlet-triplet qubit requires a spin-to-charge conversion mechanism, typically employing the spin blockade phenomenon, by which each spin state is mapped to a unique charge state followed by a charge state measurement using an electric field sensor such as a quantum point contact.² We investigate alternative mechanisms for spin-to-charge conversion involving metastable excited charge states made possible by an asymmetry in the tunneling rates to the leads.³ This technique is used to observe Landau-Zener-Stückelberg oscillations of the S-T₊ qubit within the (1,0) region of the charge stability diagram.⁴ The oscillations are π phase shifted relative to those detected using the standard technique and display a non-sinusoidal waveform due to the increased relaxation time from the metastable state.⁵

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²Petta et al., Science 327, 669 (2010).

³Studenikin et al., Appl. Phys. Lett. 101, 233101 (2012).

⁴Mason et al., Phys. Rev. B 92, 125434 (2015).

⁵Granger et al., Phys. Rev. B 91, 115309 (2015).

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