Multi-perspective Microscopy Reconstruction of Interface Atomic Disorder to Infer Silicon Quantum Dot Variability

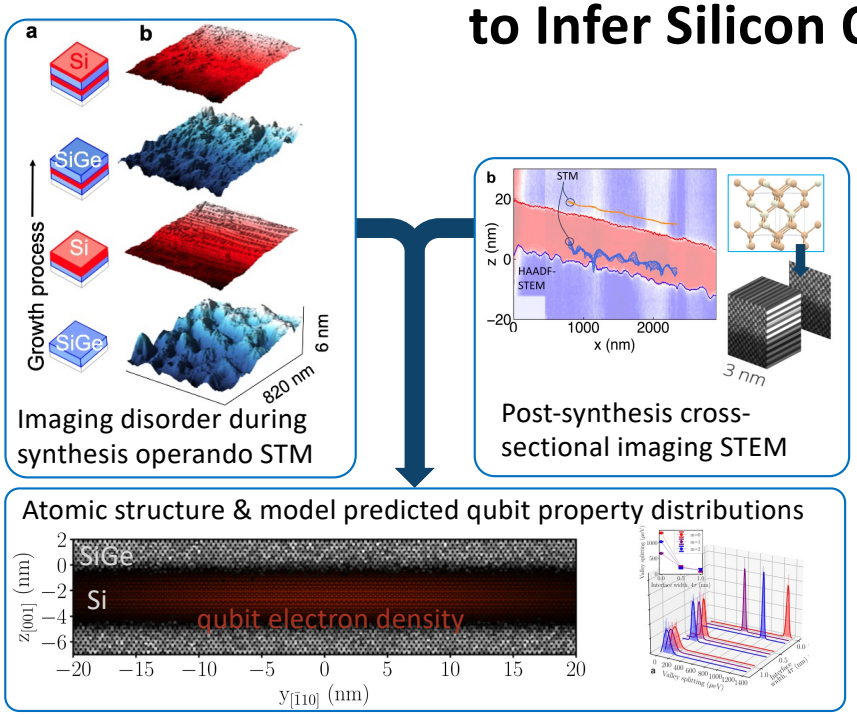

Figure: Inferring Si/SiGe interface disorder from multi-perspective atomic resolution images to calculate disorder-induced qubit variability.

Peña, L. F.; Koepke, J. C.; Dycus, J. H.; Mounce, A.; Baczewski, A. D.; Jacobson, N. T.; Bussmann, E. Modeling Si/Sige Quantum Dot Variability Induced by Interface Disorder Reconstructed from Multiperspective Microscopy. *npj Quantum Information* 2024, *10.*

Scientific Achievement

Demonstrated large-scale reconstruction of atom-scale structure hidden at semiconductor interfaces.
Through modeling, we infer resulting variability in quantum dot properties relevant for silicon qubits.

Significance and Impact

Si/SiGe is a promising material for making Si qubits, but disorder affects qubit performance and yield.
This approach enables measurement of atomic disorder and modeling of qubit variability to address this problem.

Research Details

- Atom-scale imaging with scanning tunneling microscopy during growth and post-growth scanning transmission electron microscopy.
- Quantum dot properties modeled with Schrödinger solves that incorporate measured atomic positions.