

IMPERIAL

Charge Noise in Semiconductor Qubits for Quantum Computing

Chen Huang | Department of Physics, Imperial College London

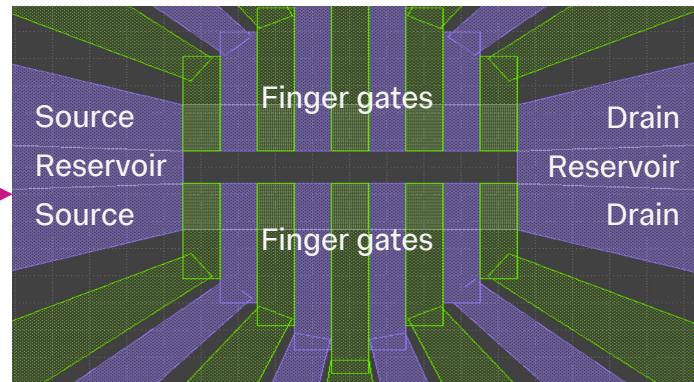
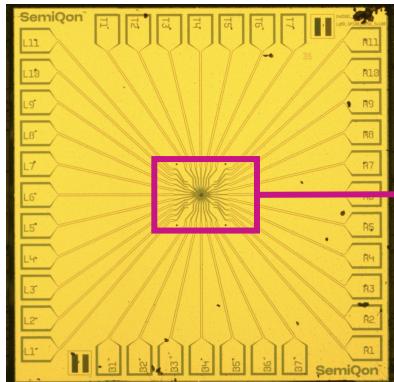
Supervisor: Prof. Dr. Myungshik Kim

Co-supervisor: Dr. John Michniewicz

Research scope

Si-based quantum dots, charge noise

Device



Key challenge

Method

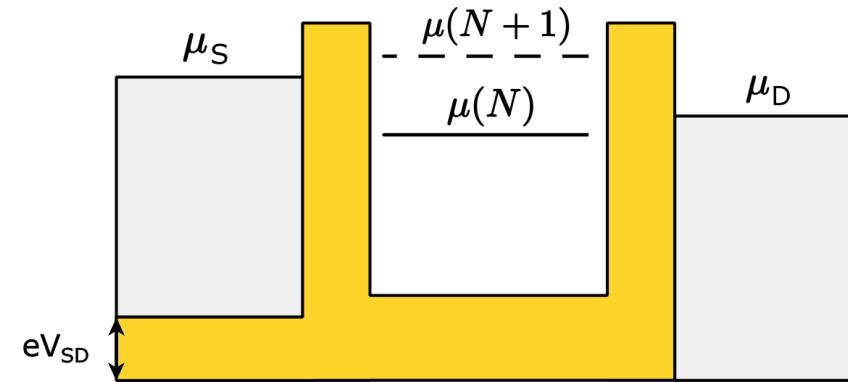
gate-manager: <https://github.com/chenx820/gate-manager>

gate-manager Public

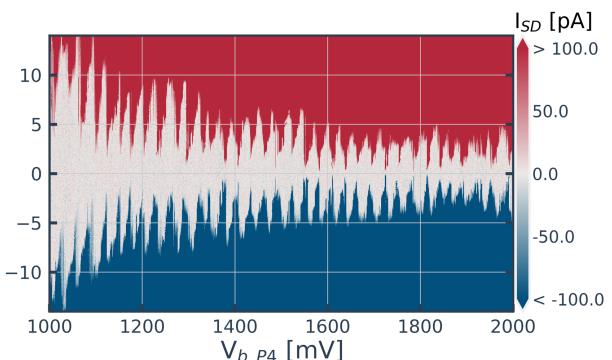
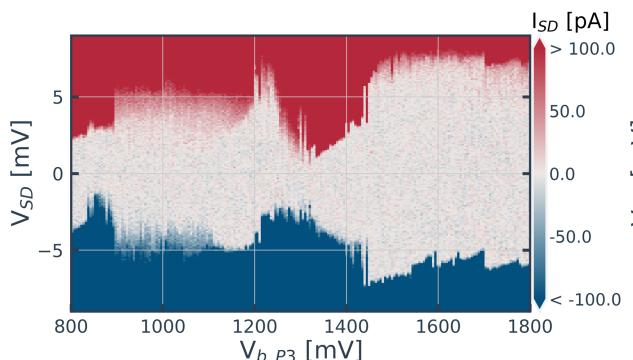
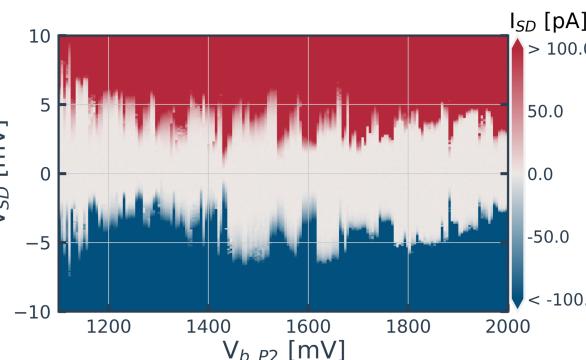
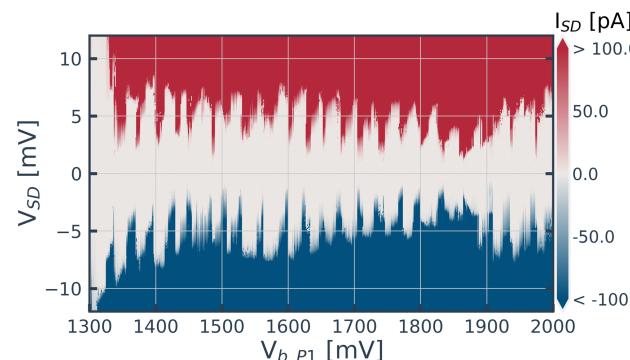
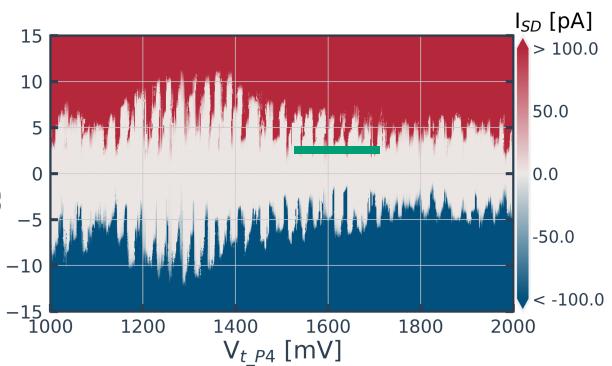
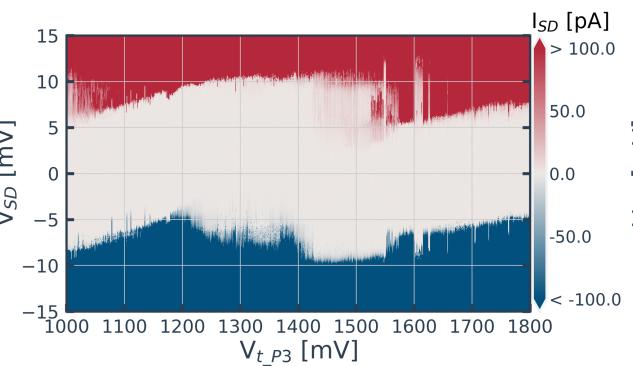
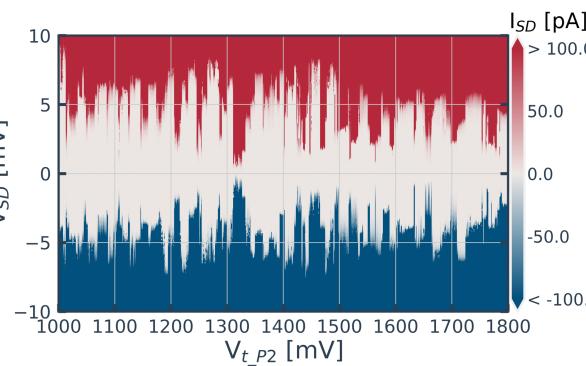
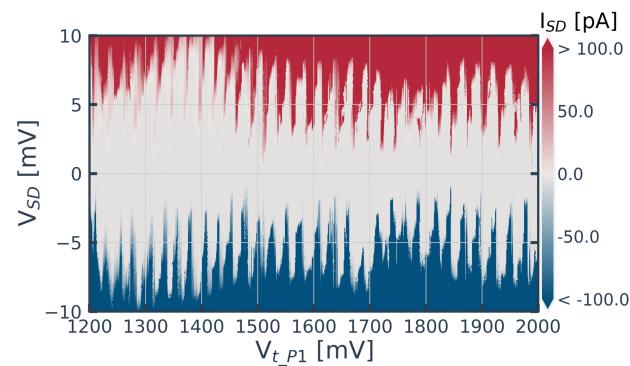
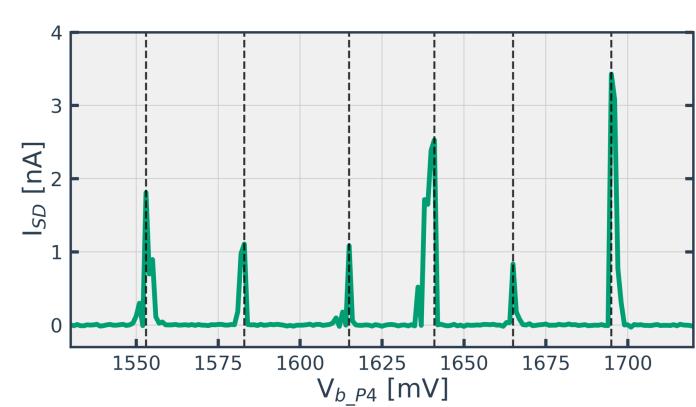
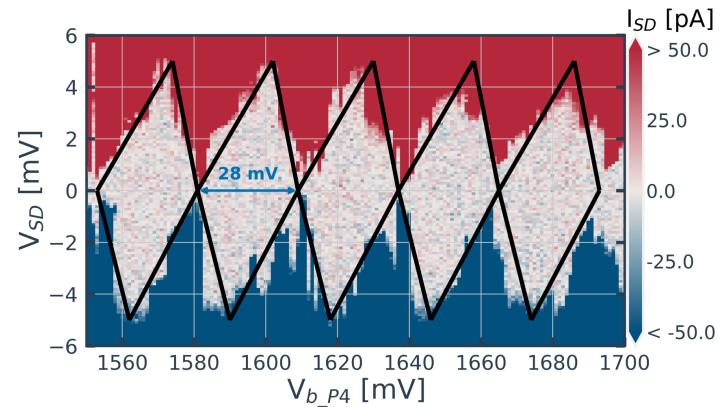
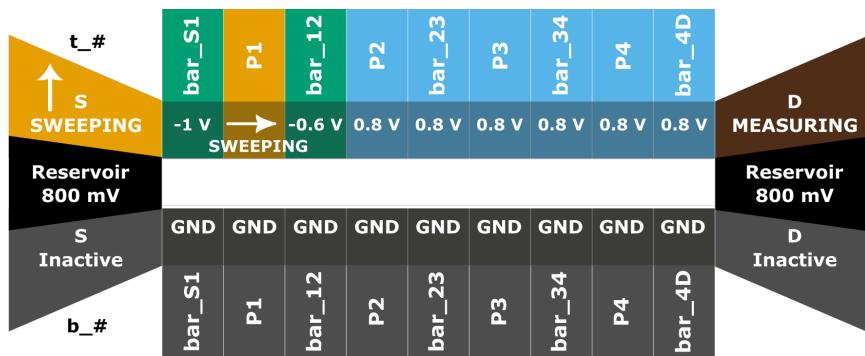
A Python package designed to automate quantum device experiments, providing simple commands to control gate voltages, perform complex sweeps while reading currents, and log all results.

Python ⭐ 1

Charge transport through quantum dots



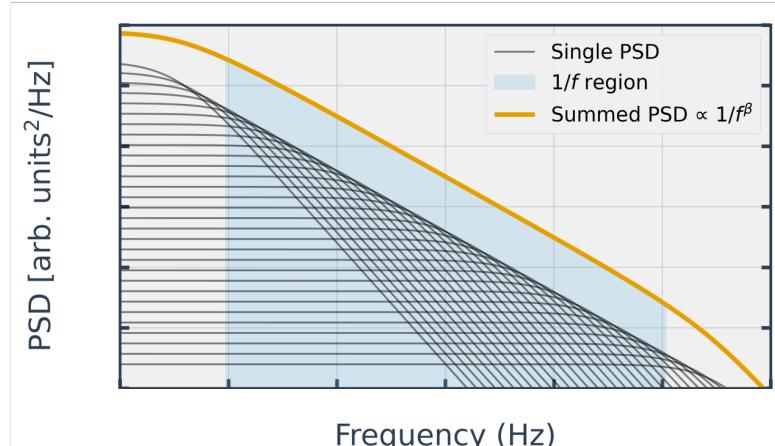
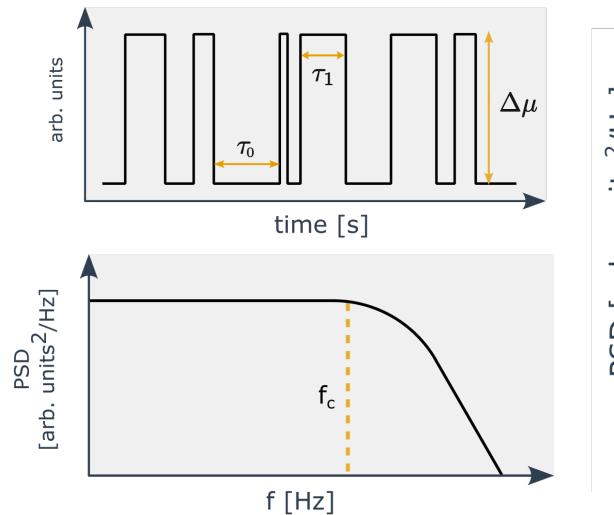
Key Results Coulomb diamonds



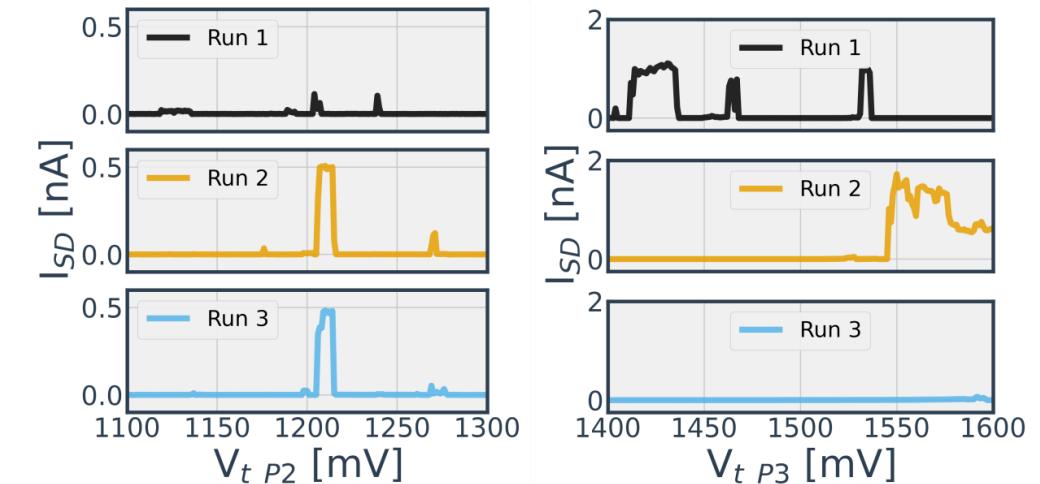
Key Results

Charge noise

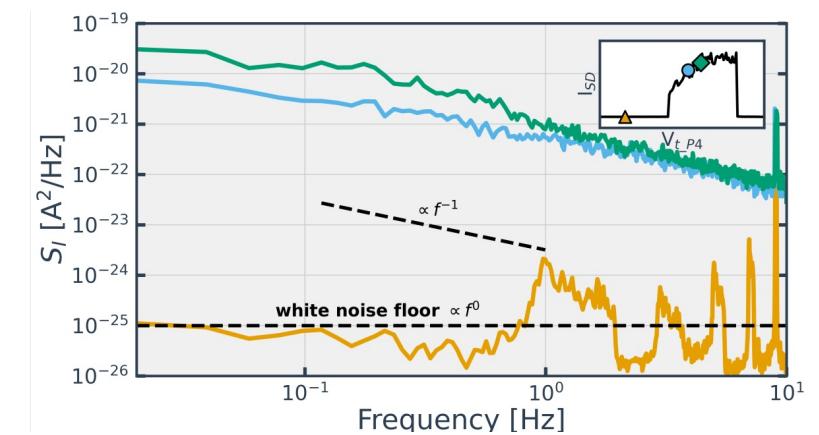
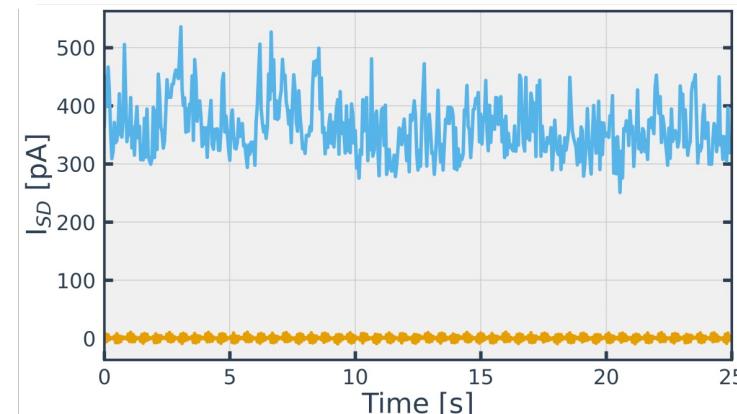
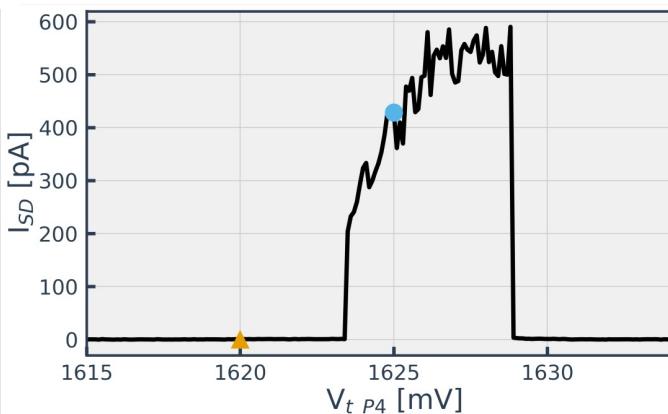
From two-level fluctuators (TLFs) to 1/f noise



Unstable peaks

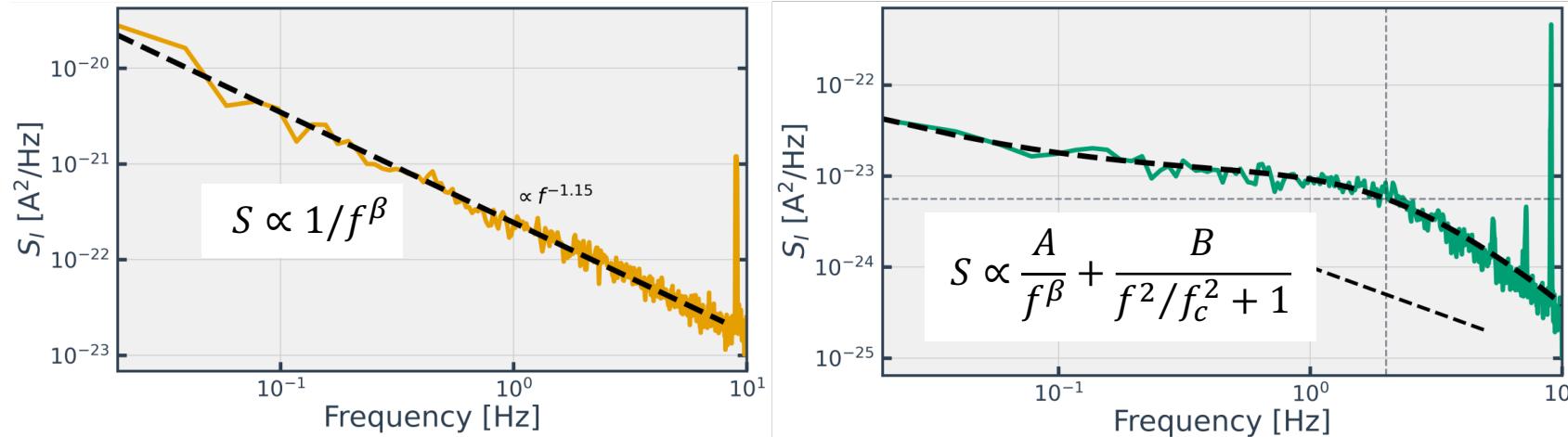


From time series to frequency spectra



Key Results & Conclusion

Fitting



Possible reasons for spatial variability

- Oxide thickness and quality
- Electrostatic screening
- Local material environment

Spatial variability

