

# Single Impurity Electronics for Quantum Computing Coherent Transport Adiabatic Passage (CTAP)

## Objective:

- Investigate CTAP in realistic setting.
- Include Si full bandstructure, TCAD gates, interfaces.
- Finding the adiabatic path: 3 donor device.
- Investigate effects of straggle in a many-donor chain – model possible expts.

## Approach:

- TCAD gates coupled with a 3 donor TB. Hamiltonian to obtain molecular states in the solid state.
- Simulate 3-4 M atoms for a realistic device.
- Compute time of 4-5 hours on 40 procs.
- Fine tune gate voltages to explore CTAP.

## Results / Impact:

- Demonstrated that the CTAP regime exists for a 3 donor test device.
- Improvement of previous results which typically ignored the host material and realistic donor and gate potentials.
- Developed the tool to simulate realistic CTAP for donors to guide future expt design.
- Publication in preparation.

