

Objective:

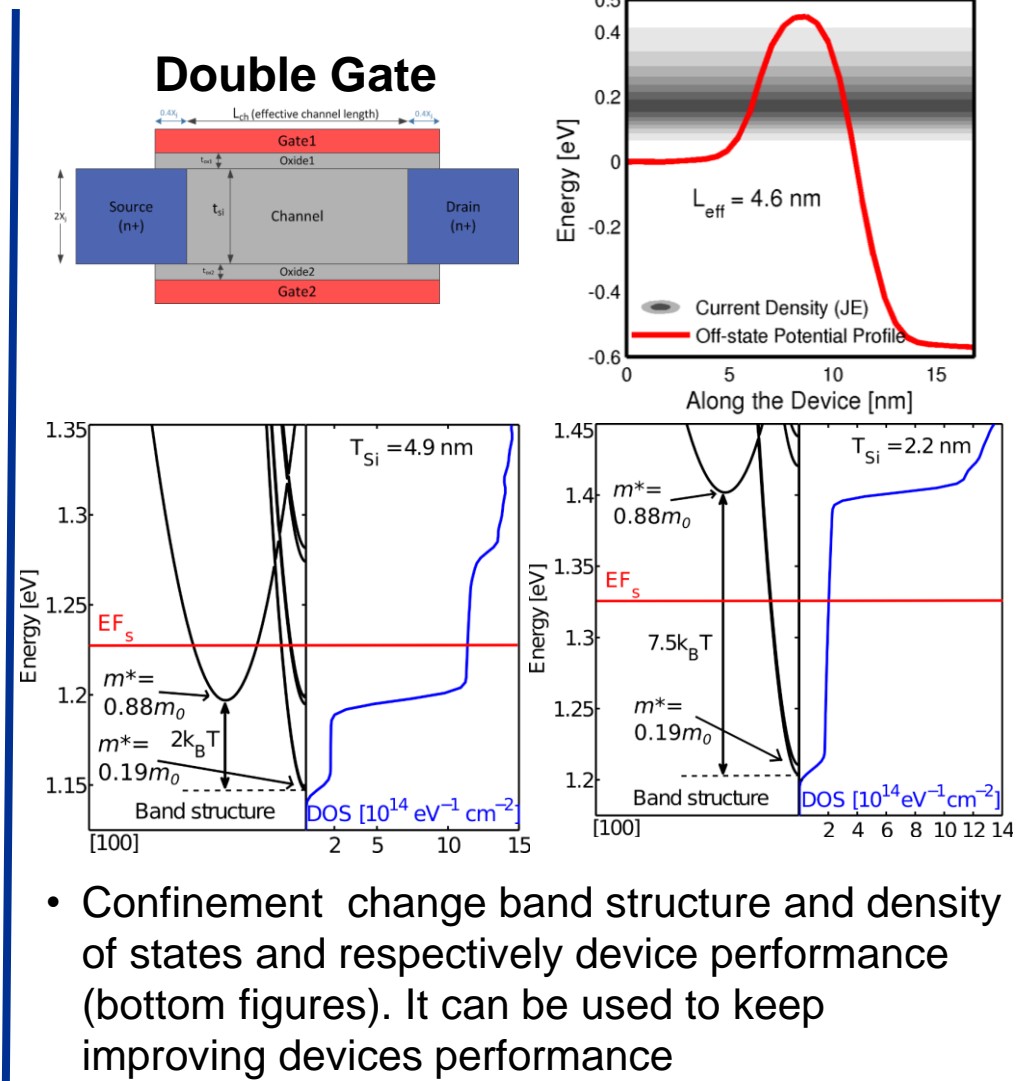
- Analysis of the issues at the end of ITRS roadmap (2026)
- Finding potential solution

Approach:

- Full-band (tight binding) NEGF
 - To capture confinement effects on band structure
 - To capture source/drain tunneling accurately for short devices
- Series resistance by post-processing
- Rigorous electron-phonon scattering (for few cases)

Results/Impacts:

- Silicon can be used for next 15 years
- Source to drain tunneling is very important in UTB with length less than 5 nm (Fig. top left)
- Carrier mass is not a material property anymore. It depends on material, geometry, confinement, orientation and strain.



- Confinement change band structure and density of states and respectively device performance (bottom figures). It can be used to keep improving devices performance

This project is part of ITRS-PIDS prediction project in collaboration with SRC. The results are published at TECHCON 2013 and ISDRS 2013.