

Objective:

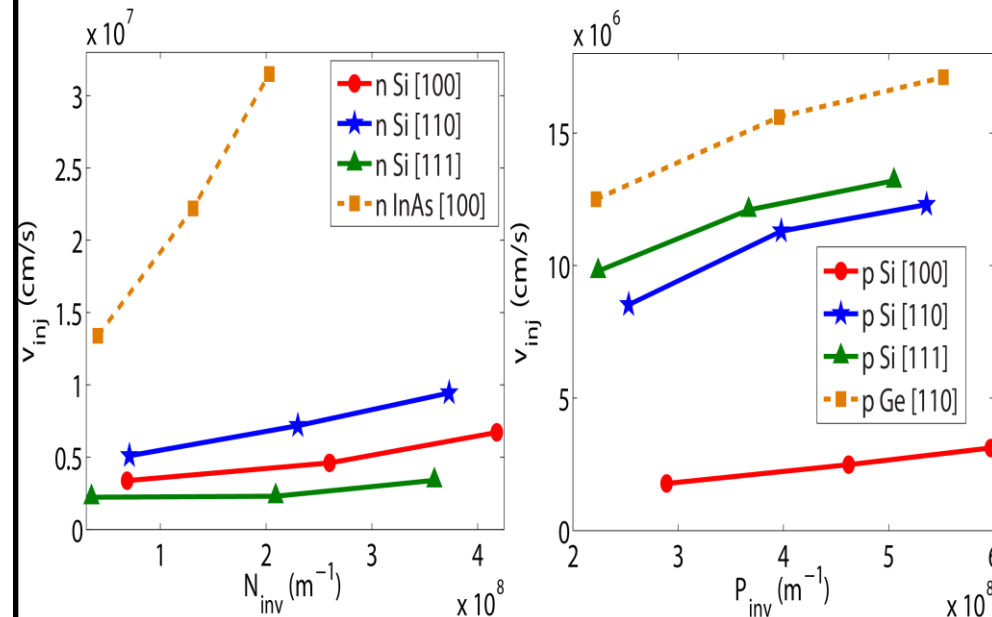
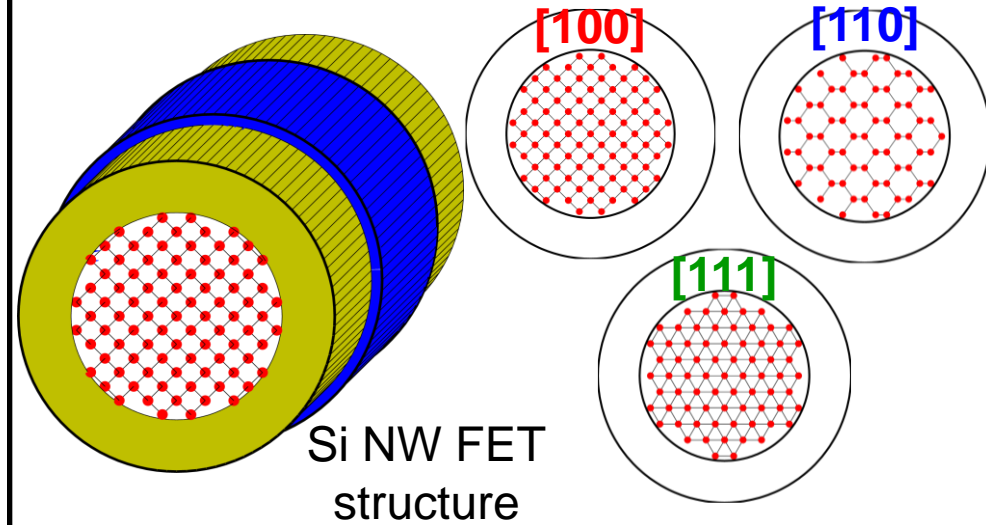
- Calculate phonon-limited injection velocity v_{inj} and ballisticity at the top-of-the-barrier in n -type Si and InAs and p -type Si and Ge NW FETs with different orientations

Approach:

- Tight-binding ($sp^3d^5s^*$) description of the electron/hole properties
- Atomistic Representation of the NWs
- Quantized phonon dispersion (**VFF**)
- Quantum transport with **NEGF**

Results and Impacts:

- v_{inj} as function of the charge density at the top-of-the-barrier
- [100] InAs NW highest electron velocity and close to ballistic limit
- [110] Ge NW highest hole velocity, but 50-60% of ballistic limit



Caption: Phonon-limited electron (left) and hole (right) injection velocity in Si, Ge, and InAs NW FETs