NANOACADEMIC TECHNOLOGIES

Coherent Modeling

QTCAD® licenses are commercially available!

Advanced Quantum Chip Design Software

Nanoacademic offers an innovative and unique first-principles computer-aided design tool dedicated to spin-qubit and superconducting-qubit modeling. **This is QTCAD®.**

QTCAD® (**Q**uantum-**T**echnology **C**omputer-**A**ided **D**esign) is a multiscale (finite-element method and atomistic) simulator used to predict the performance of spin-qubit and superconducting-qubit devices before their production. These predictions can result in huge savings in terms of time and money, which enables the exploration of more design scenarios, similar to practices in the semiconductor industry. **QTCAD®** uses Poisson, Schrödinger, and Maxwell solvers to calculate design critical parameters and predict quantum devices performance based on key figures of merit.

Key features (v2.0):

- See full release notes on https://portal.nanoacademic.com/products/products/releasenotes/qtcad

NEW! *QTCAD® Atoms* for multiscale simulations of quantum dots using the atomistic tight-binding (TB) method:

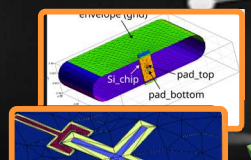
- An atomic structure builder for heterostructures which includes realistic nonidealities (strain, random alloying, surface roughness)
- A TB electronic structure solver which accounts for the effects of strain, magnetic fields, and spin-orbit coupling
- Built-in support for heterostructures of Si, Ge, arbitrary SiGe alloys, and SiO2
- Various analysis tools such as atomistic wavefunction visualizers, matrix-element calculators, and g-tensor calculators
- Interfaces to QTCAD®'s FEM modeling capabilities like inclusion of a gate-induced confinement potential enabling multiscale simulations

NEW! *QTCAD®* superconducting circuit modeling features:

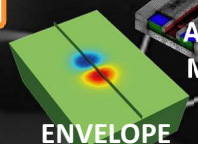
- A capacitance matrix solver based on an adaptive-mesh linear Poisson solver to handle typical sharp corners & embedded 2D surfaces
- A frequency-domain finite-element Maxwell solver to compute the eigenmodes of superconducting resonators and cavities

- **NEW!** Periodic boundary conditions for the linear and non-linear Poisson solvers
- **NEW!** Added the Friesen model in the Multi-Valley Effective-Mass Theory (MVEMT) solver complementing the Shindo-Nara model
- An electrostatics tool for quantum dot confinement potentials in semiconductors
- A many-body Schrödinger solver for electrons and holes
- A master equation solver for quantum transport calculations in the sequential tunneling regime (Coulomb blockade)
- An NEGF* solver for non-equilibrium quantum statistics and quantum transport in two-probe devices
- A computationally efficient workflow for charge stability diagrams of few-quantum dot systems including cross-capacitive effects
- A Hybrid 3D/1D quantum-well Schrödinger-Poisson solver
- Possibility to define custom defect charge-density profiles to model point charges and dopants
- A general workflow for electric-dipole spin resonance (EDSR) interfacing with QuTiP for both electrons and holes
- Works at cryogenic (sub-K) temperature thanks to our adaptive meshing technique
- Arbitrary 1D/2D/3D device geometries enabling to study many practical designs

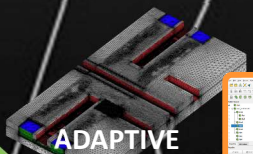
** Non-equilibrium Green's functions*



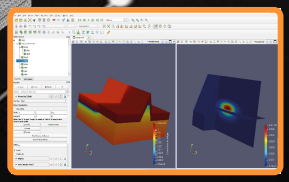
SUPERCONDUCTING QUBITS



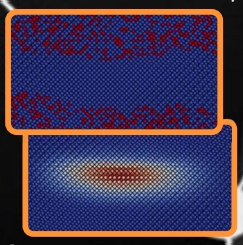
ENVELOPE FUNCTIONS



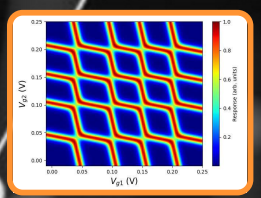
ADAPTIVE MESHING



QUANTUM-DOT MODELING



ATOMISTIC MODELING



CHARGE-STABILITY DIAGRAMS

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Single-user and group/team licenses

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