



# QTCAD v2.2

## Advanced Quantum Chip Design Software

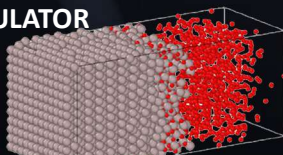
Nanoacademic offers an innovative and unique computer-aided design tool dedicated to the simulation of superconducting qubit systems. This is QTCAD®.

QTCAD® (Quantum-Technology Computer-Aided Design) is a multi-scale simulator used to predict key performance figures of merit of superconducting-qubit devices prior to fabrication. By enabling accurate, physics-based performance forecasting, QTCAD® helps reduce development time and cost while allowing designers to explore a broader range of layout configurations, like in the established design workflows of the semiconductor industry.

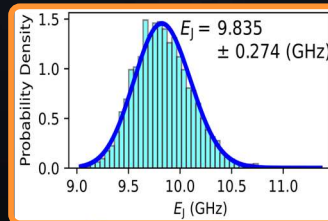
### QTCAD® superconducting chip modeling features:

- **NEW!** A unique Josephson-junction energy solver that enables  $E_J$  variability studies from Al/AIO<sub>x</sub> surface roughness effects. The solver leverages NEGF and the Ambegaokar-Baratoff relations and allows the direct use of the exact CAD layouts of junctions
- **NEW!** Driven Maxwell solver with adaptive meshing and microwave network analysis capabilities (S and Z matrices)
- **NEW!** Post-processing module to perform energy-participation ratio analyses directly from the Maxwell eigenmode solver
- 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 circuits such as resonators, cavities, and transmons. Supports inductive lumped ports
- Transmon eigenmode extraction using Josephson inductance from experimental characterization, device-scale Josephson energy calculations, or atomic-scale first-principles simulations with NanoDCAL
- QTCAD® Builder & device Visualizer: Simplifies 3D device model building from layout files and eases the pre-processing, presentation and debugging with Gmsh, QTCAD® Builder, or Quantum Metal
- Fully scriptable thanks to a user-friendly Python API

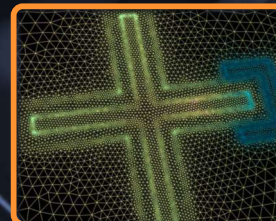
### 3D JOSEPHSON JUNCTION SIMULATOR



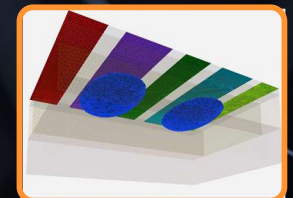
CUSTOM VARIABILITY MODELS FROM EXPERIMENTAL DATA OR MD SIMULATIONS



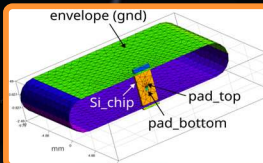
JOSEPHSON ENERGY VARIABILITY



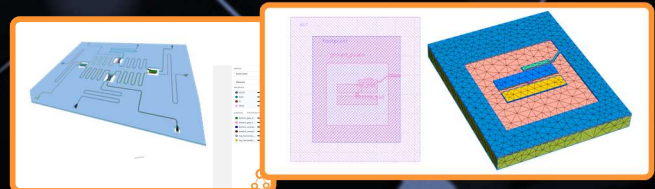
ADAPTIVE MESHING



QUANTUM DOTS & TRANSPORT



SUPERCONDUCTOR CIRCUITS



NEW TOOLS INCLUDING A DEVICE BUILDER

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