CADTRONICS

CADtronics
microscopic noise simulation

CAD Software For
- Infrared Detectors
- Infrared Lasers
- LEDs
- Thermal Photovoltaics

CADTRONICS

Microscopic noise simulation

Design optoelectronic devices, such as light-emitting diodes (LEDs), photodetectors, sensors, modulators, photovoltaic systems, and lasers

Robust, fast, and accurate software that calculates the properties of III-V materials formed from layered semiconductors and identifies the microscopic sources of intrinsic loss and noise that degrade quantum devices
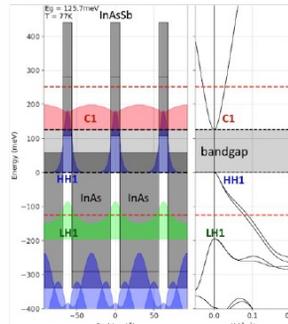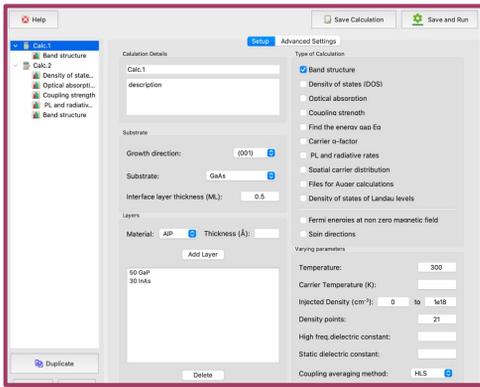

Easily export results into your favorite plotting program

Engineer spintronic devices such as spin LEDs, spin lasers, etc, allowing the characterization and forecasting of quantum coherence/decoherence effects

Calculate band structures, the bandgap, the density of states, coupling strengths, and optical properties, such as absorption, photoluminescence, and radiative rates as a function of environmental and device parameters
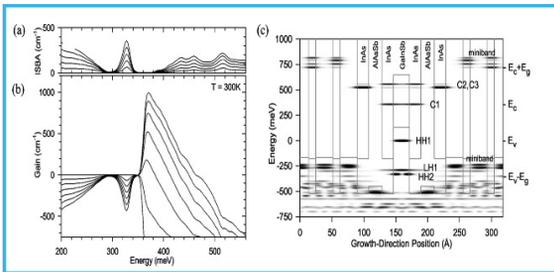
Mid-infrared InAs/GaInSb laser diode example. (a) Intersubband absorption and (b) gain spectra. (c) Spatial distribution of the zone-center superlattice states. See [1] for more details.
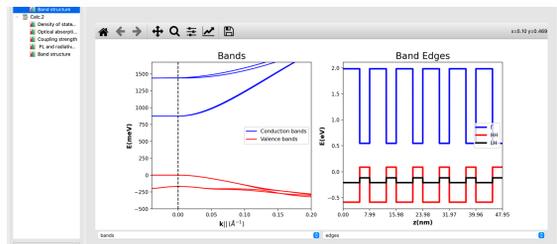
Elevate your device performance with optimized material parameters, predictable quantum effects, and reduced loss and noise.

[1] J. Appl. Phys. 89, 3283-3289 (2001)

QuantCAD

CADTRONICS

- ✓ **State-of-the-art 14-band k.p band structures**

  Captures intervalence mixing, non-parabolicity, and strain effects

- ✓ **User friendly interface**

  Delivers an intuitive, seamless simulation and visualization workflow for rapid material exploration and device optimization

- ✓ **Rapid high-throughput calculation time**

  Band-structure and band-edge calculations in seconds, optical-property simulations in minutes, and full Auger recombination runs in 1–5 hours, ideal for large-scale superlattice optimization

- ✓ **Integrated Auger recombination modeling**

  Includes direct and Umklapp processes—essential for predicting radiative efficiency and dark-current limits in mid-IR and LWIR devices

- ✓ **Environment-aware simulation**

  Accounts for temperature, doping, and carrier-density dependencies, providing realistic predictions of device behavior under experimental operating conditions

- ✓ **High-field transport available**

Cadtronics is available for Windows, Mac, and Linux systems with either a node locked or floating license

Contact us at sales@quantcad.com or visit us at https://quantcad.com/cadtronics/ to arrange for a 30 day demo license or to request a customized introduction to the software

FFRDC, academic, student, and small business pricing available

Material composition, alloys and layer thickness	Carrier Density
Carrier Concentrations	Energy range & resolution for band structures, DOS, absorption
Range of radiation wavelengths	
Substrate & growth direction	Doping & temperature sweeps for DOS, PL, absorption
Explicit interface monolayers	Adjustable conduction & valence bands
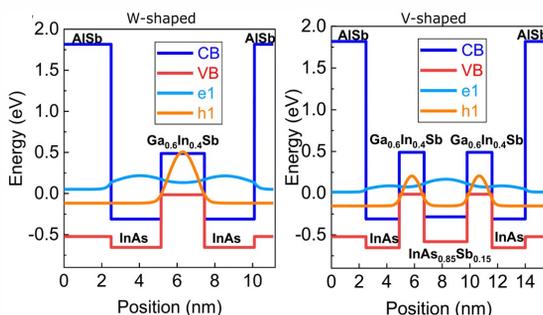
[2] Phys. Lett. A 561, 130971 (2025).
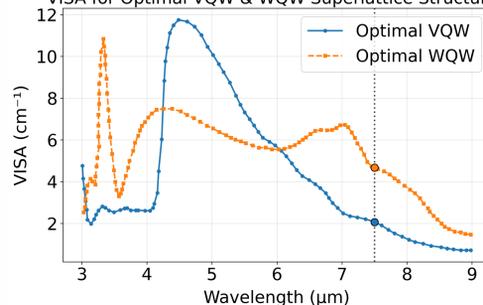
CADtronics-optimized special type-II quantum-well structures enable room-temperature operation of inter-subband cascade lasers [2]

A software suite capable of identifying microscopic sources of loss and noise that degrade quantum devices

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