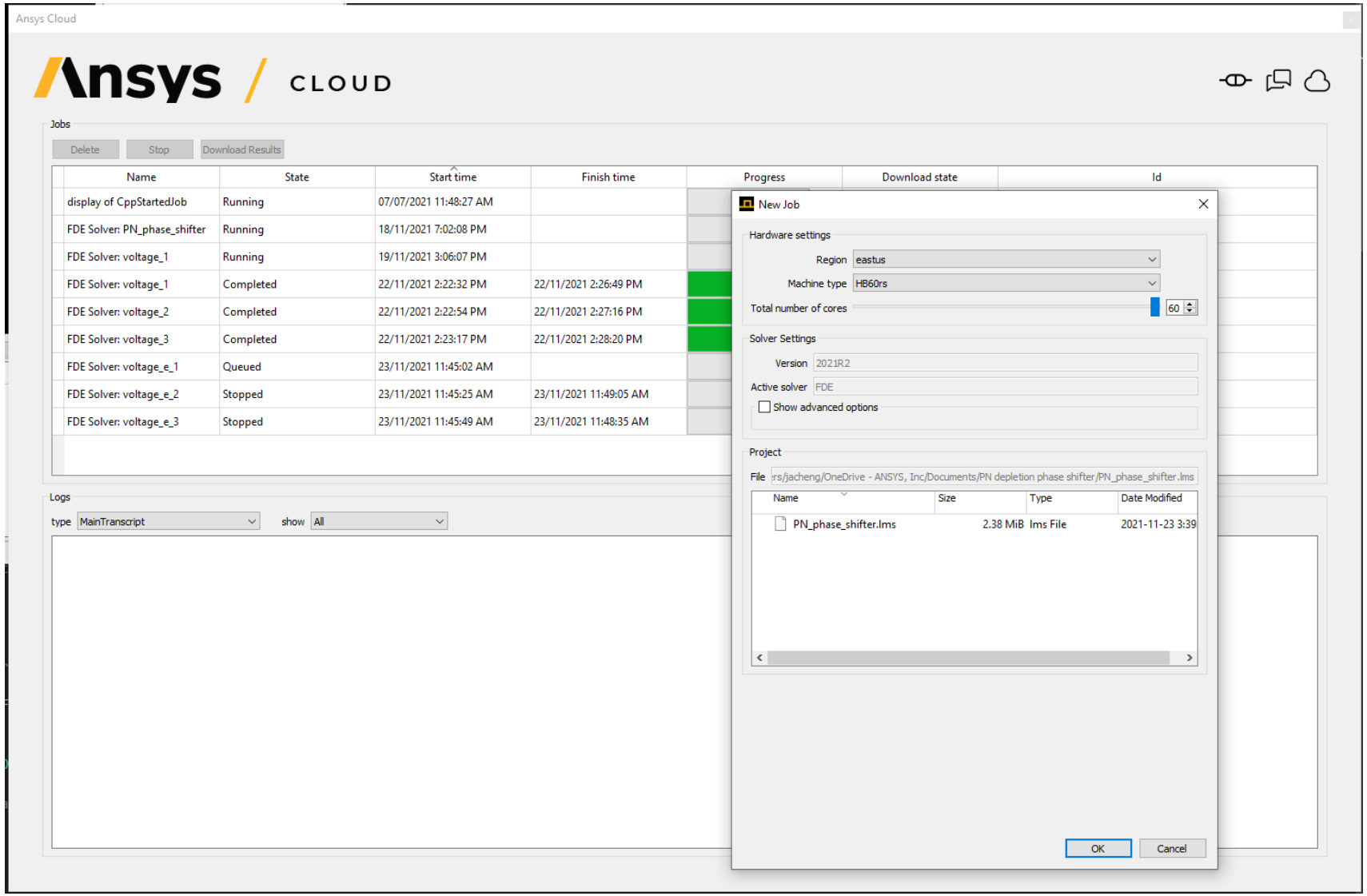
Release 2022 R1 Highlights
Photonics (Lumerical)

Ansys Cloud HPC Services Integration

- Native UI widget in-product for interfacing with Ansys Cloud HPC Services
  - login, connection status, job submission/monitoring/ control, file upload/download
- Support for Batch (distributed) Solves and Parametric Sweeps
- Complements the VDI access to Ansys Cloud Direct introduced in 2021 R2



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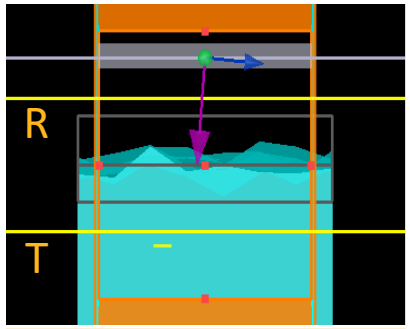
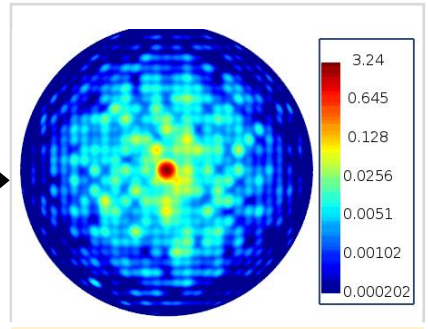
SPEOS Surface Models: BSDF/BRDF Format Exchange (BETA)

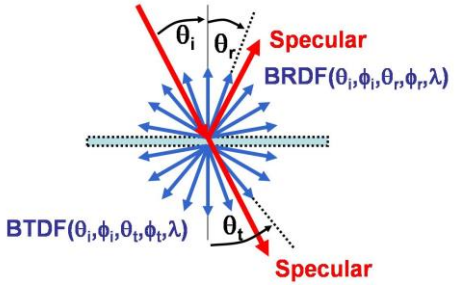
Ansys
Lumerical FDTD



Design



Photonic Simulation



Export

BSDF/BRDF file

Import

Ansys
Speos

Photometric Simulation

Experience

Parametrized micro design → Lumerical FDTD + Export to Far field BSDF → **.anisotropicbsdf* OR spectral **.brdf* → Photometric Simulation + Measurements → Human Vision Experience in Context

Applications: Diffusive films for displays, scattering from micro-textured surfaces, human skin models,…

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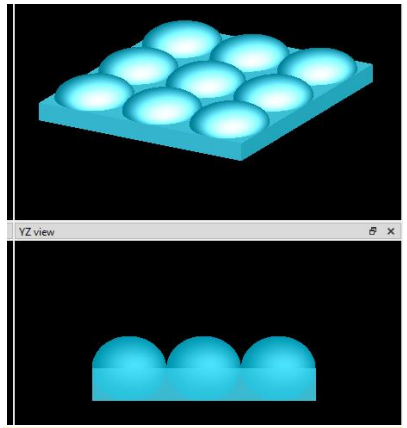
SPEOS surface models: Diffraction Grating SOP Plugin (BETA)

Ansys Lumerical FDTD



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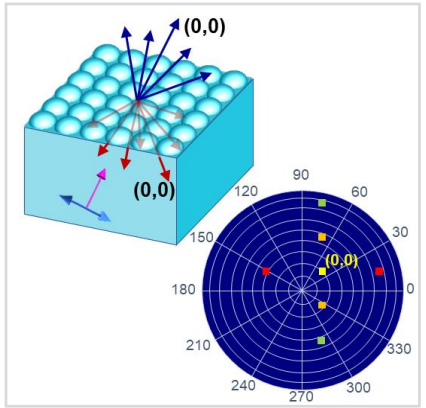


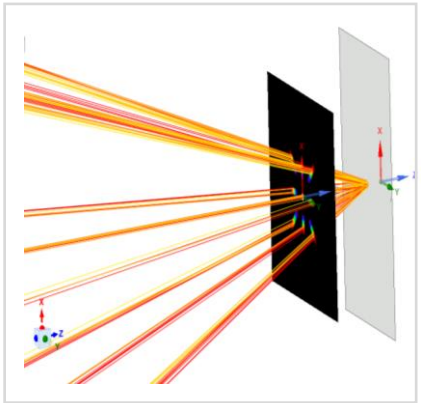
Photonic Simulation

Export

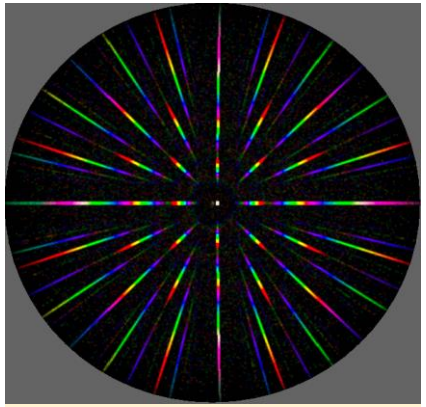
JSON file

Import

Ansys Speos



Photometric Simulation



Analysis

Parametrized micro design → Lumerical FDTD + Grating analysis → **.json* with grating data → Photometric Simulation of Diffractive Optical Element → Photometric/Radiometric Measurements

Applications: AR/VR systems, CMOS sensor stray light, spectrometers, sensing, point cloud generation,…

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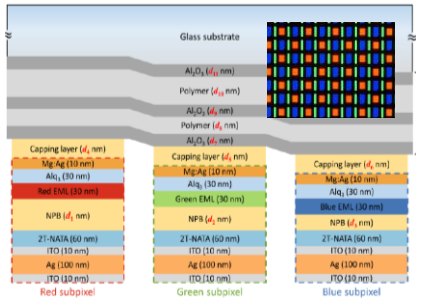
Display optimization workflow and enhancements in optiSLang integration (BETA)

Ansys optiSLang

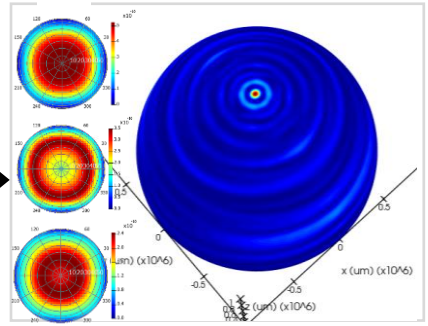
Workflow Automation

Multi-Objective Optimization

Ansys Lumerical STACK

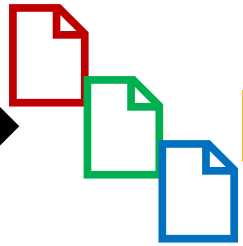


Design



Photonic Simulation

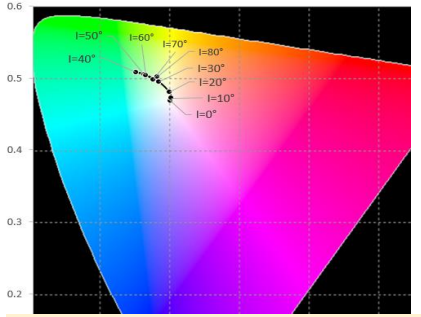
Export



RGB Intensity Distributions

Import

Ansys Speos



Photometric Simulation

Experience

Fully leverage fast STACK simulations in optiSLang workflow with enhanced integration:

- Lumerical application persists throughout iterations, avoiding additional start-up overhead
- Lumerical script files can be run directly without loading or running a project file

Ansys

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Process Enabled Active Photonic Component Design (BETA)

Foundry

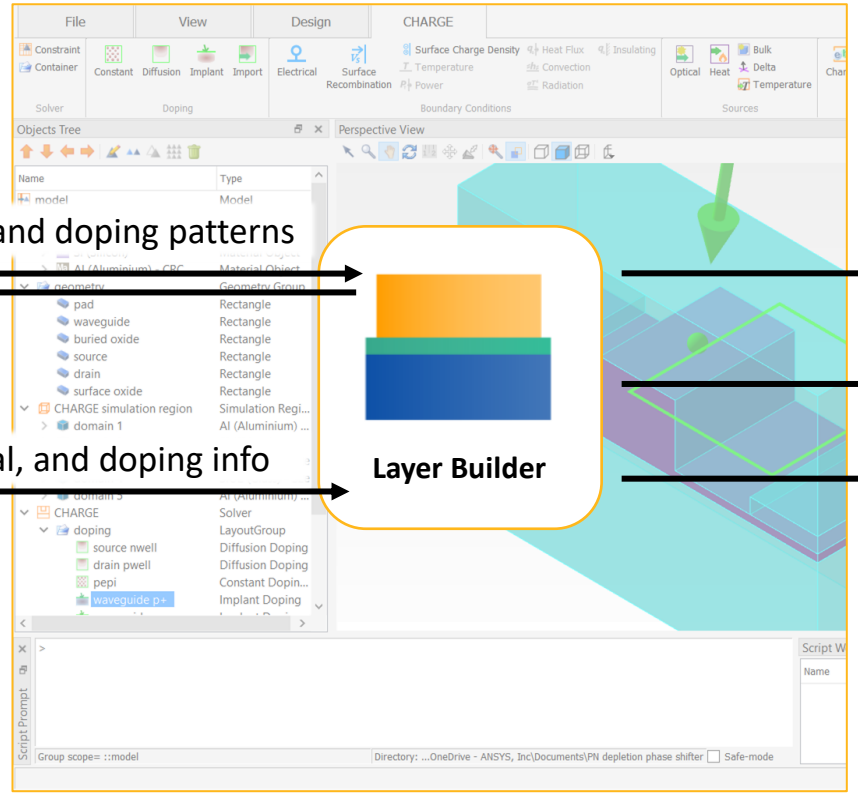
GDS

Process File

Geometry and doping patterns

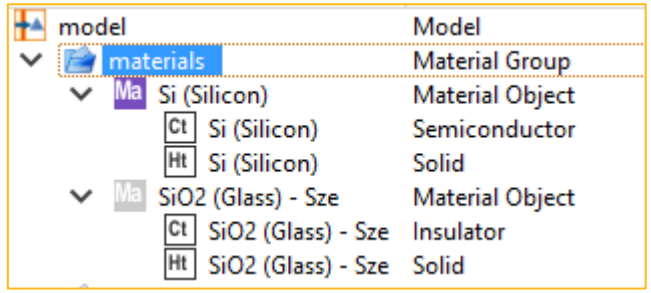
Layer, material, and doping info

Component Tools



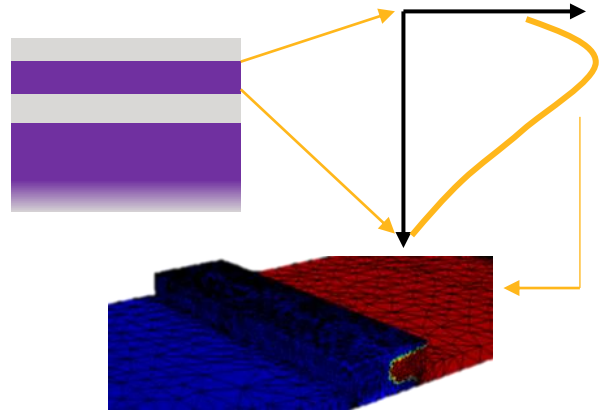
Electrical and thermal material models

(CHARGE + HEAT)



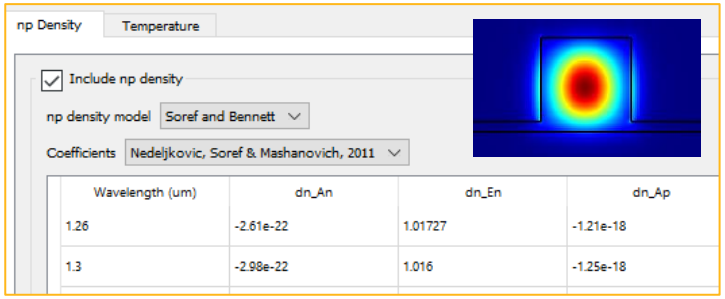
Constant and implant doping profiles

(CHARGE - BETA)



Index perturbation

(FDTD + MODE)



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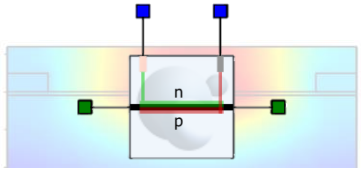
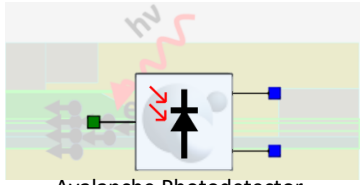
CML Compiler & Verilog-A Feature Updates

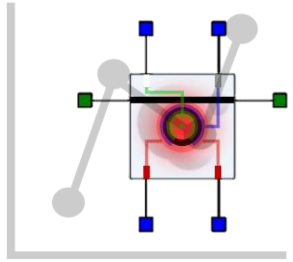
New and improved INTERCONNECT and Verilog-A photonic models



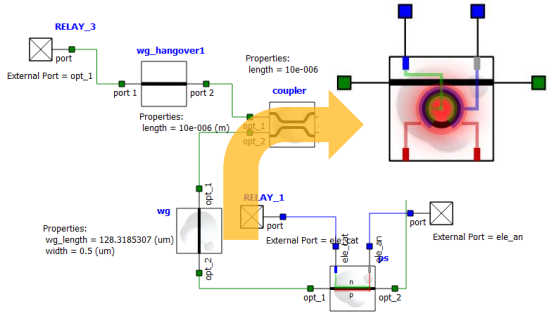
Forward-biased Phase Shifter



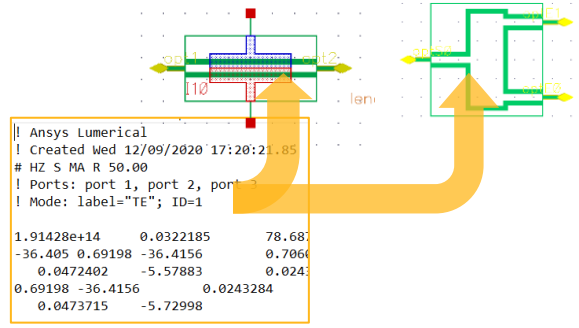
Avalanche Photodetector



Data-driven ring modulator



Customized compound model generation

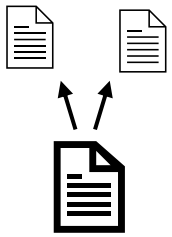


Build Verilog-A models using Touchstone data

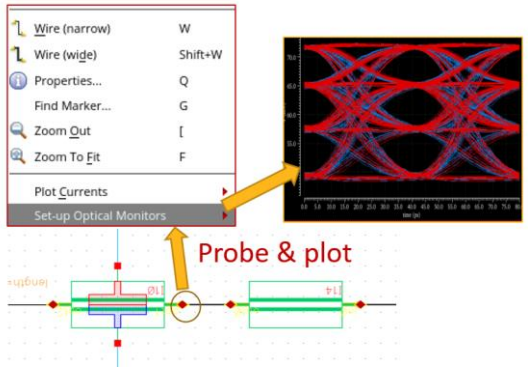
Improved usability

Data validation

Element build=status

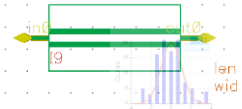


Template deployment

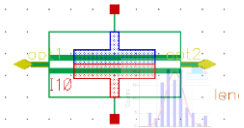


Optical monitor for photonic Verilog-A signal

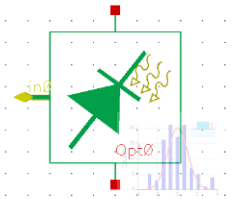
Statistical Verilog-A photonic models



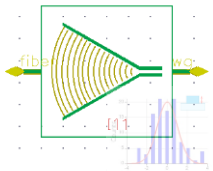
waveguide



Forward/reverse-biased Phase Shifter



Parameterized Photodetector



Grating Coupler

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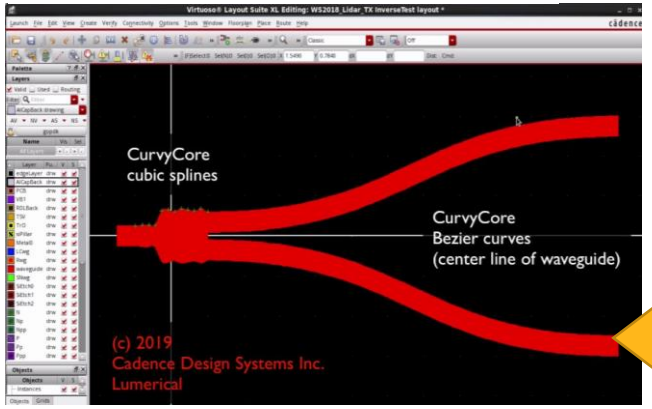
Virtuoso Layout Integration

***Design Challenges**:*

- *Users need to define layouts in both layout editor and FDTD/MODE solvers, which is time-consuming*
- *Inconsistency between two layouts is difficult to resolve*
- *Exporting GDS to FDTD/MODE does not support parametric analysis*

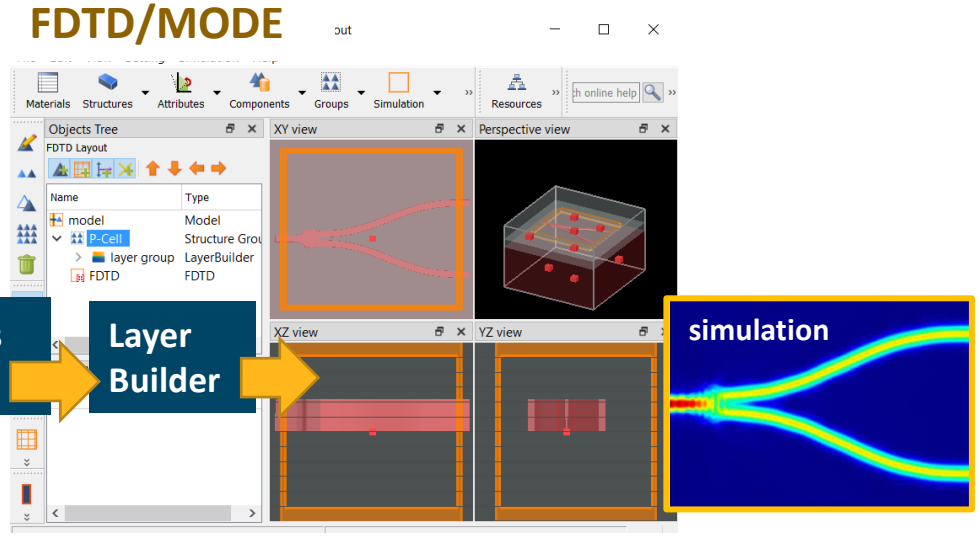
***Goal**: Facilitate component design through direct integration with Virtuoso Layout*

Virtuoso Layout Suite



direct bridge

FDTD/MODE



Communicate layout data between Virtuoso and FDTD/MODE

- *Query properties of parameterized cells*
- *Obtain polygon vertices and pins for given parameter values*
- *Easy optimization of P-Cells*

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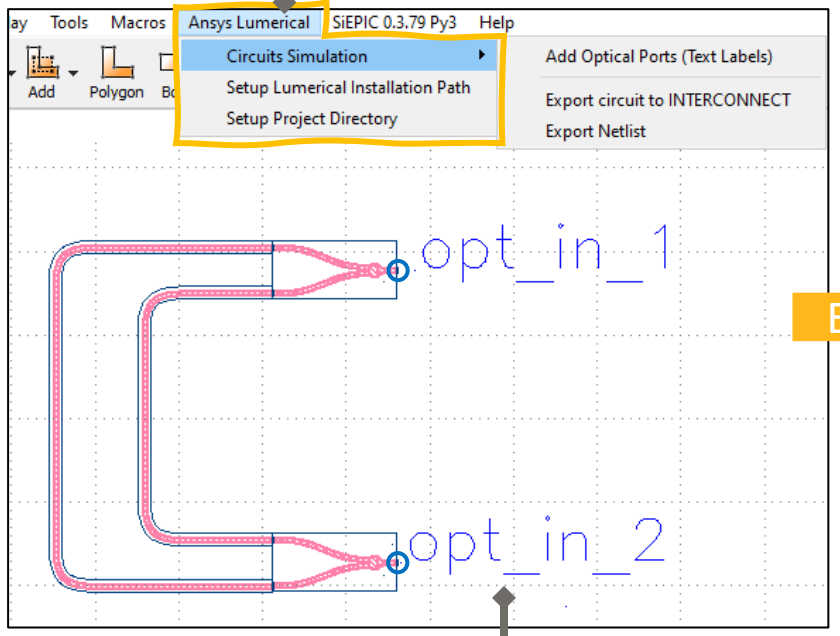
KLayout Integration

Ansys-Lumerical Package

- *Open-source project in collaboration with SiEPIC program*
- ***Goal**: create integration to support photonic layout-driven circuit designs and simulations*

KLayout



New text-type optical I/O ports

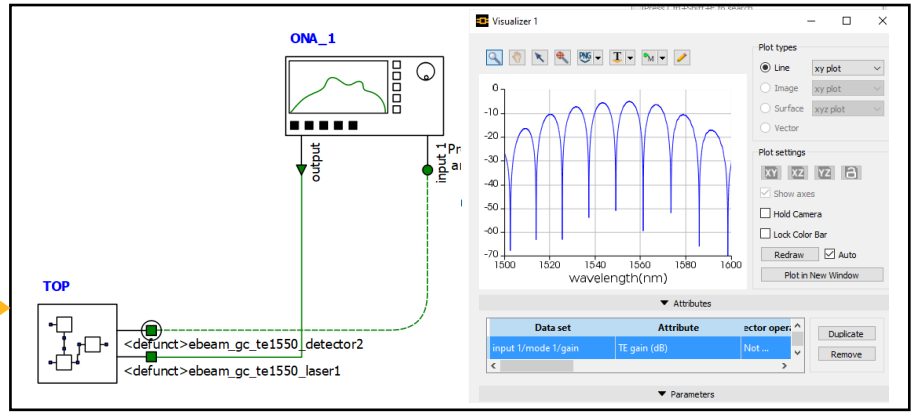
Circuit Netlist

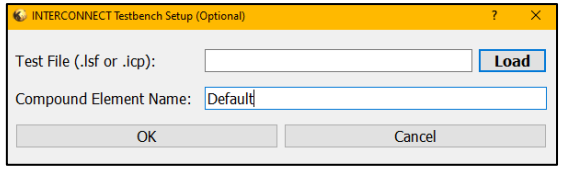
Export netlist to INTERCONNECT

Major enhancements to optical netlister

- *Support multi-circuits netlisting*
- *Support hierarchical circuits*

INTERCONNECT





New feature:

- *Load project file or script to set up test benches*

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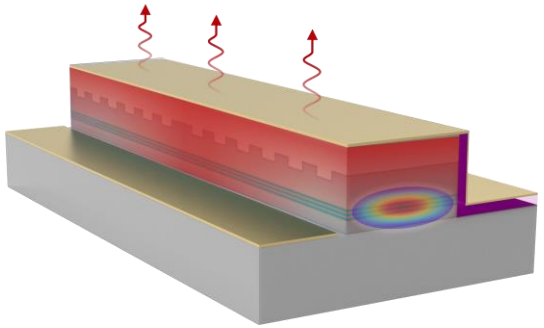
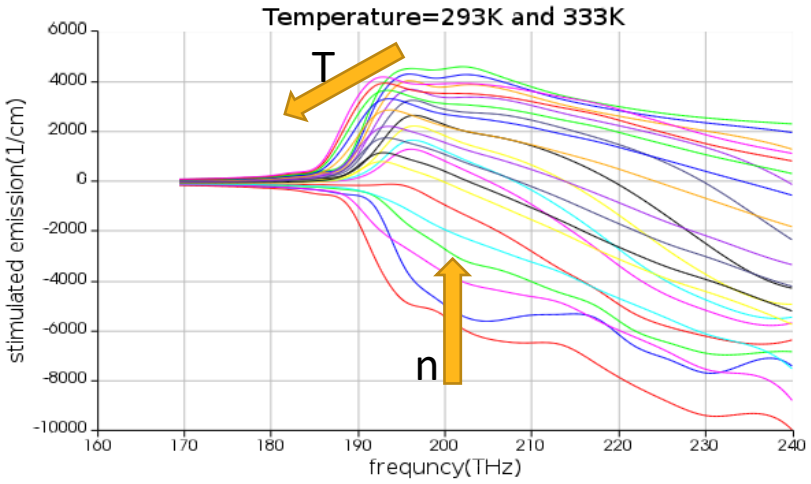
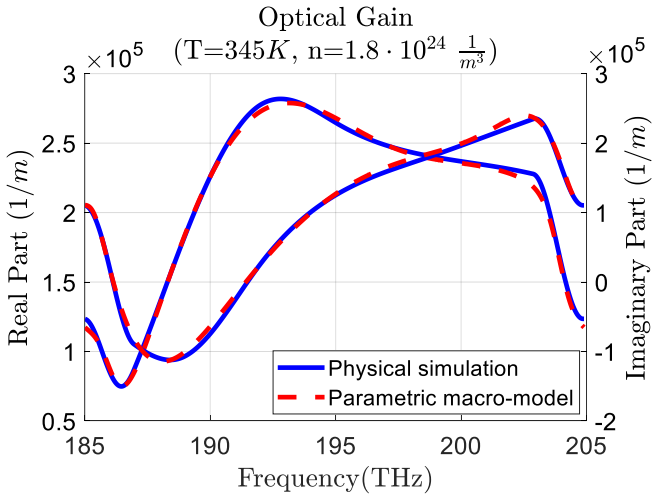
Laser Self-Heating

- Self-heating limits the output power and efficiency of the laser, impacts adjacent devices

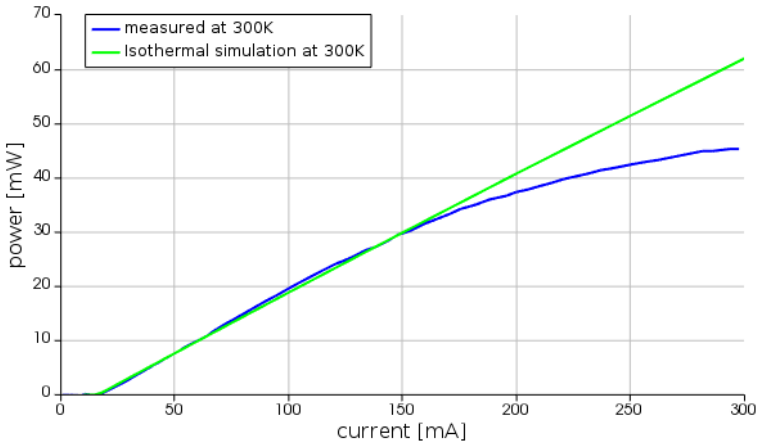




Material gain from physical simulation or measurement: parameterized by carrier density & temperature



Reduced order model accurately fits & interpolates *arbitrary* gain spectra



Fast simulation of steady state laser power vs. current with physics-informed accuracy

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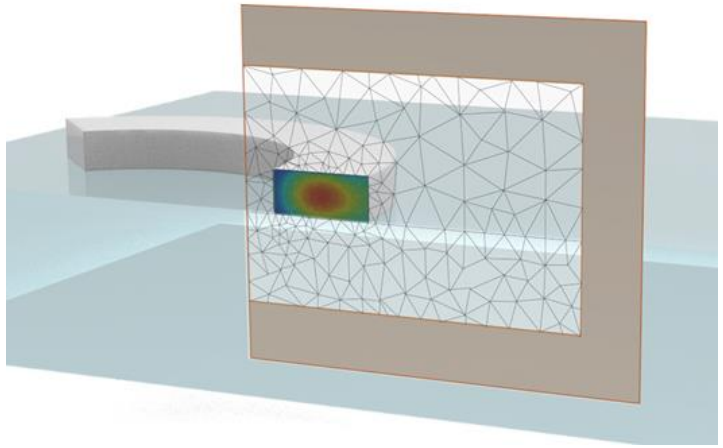
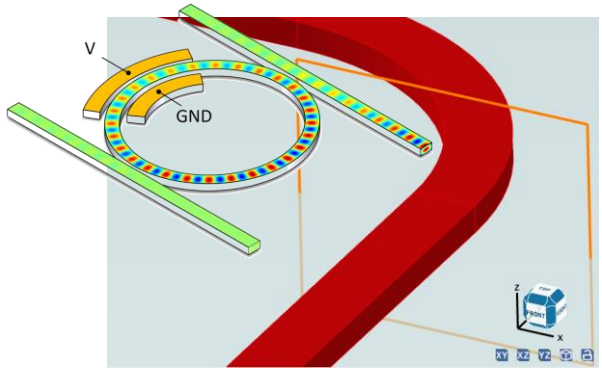
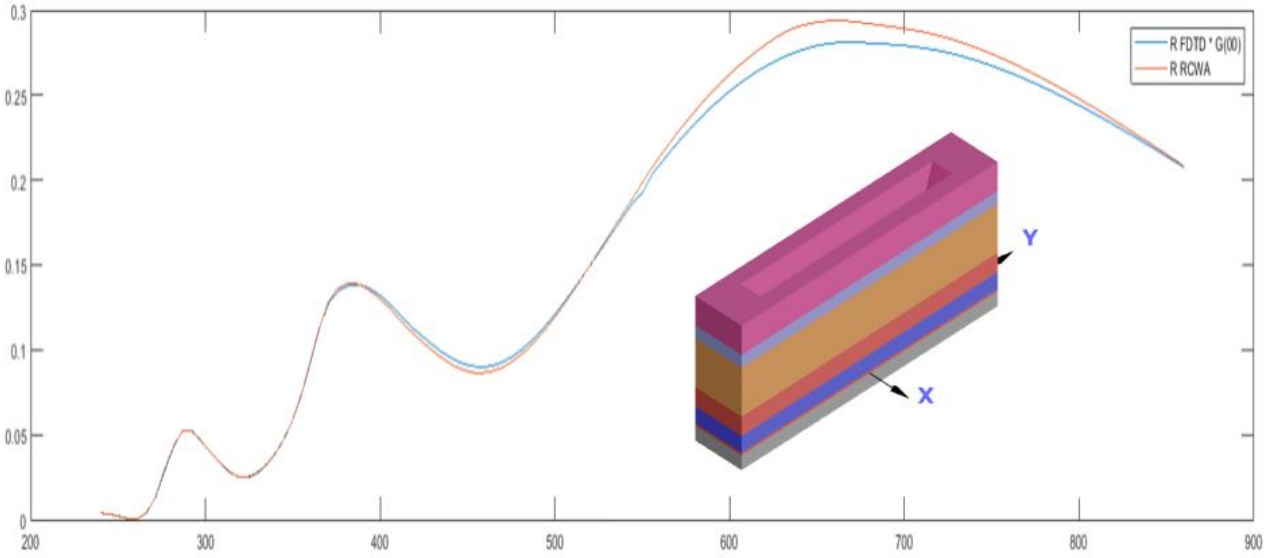
Photonics Core Technologies

- New waveguide bend calculation in FEEM for bend loss and ring analysis





- Calculate diffracted order efficiencies of 1D and 2D gratings with new of RCWA solver (BETA)
  - Script interface available in FDTD
  - Dielectric materials, periodic boundaries



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