Press Information

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# VPIphotonics Design Suite - Version 11.1

New release of industry-leading design software for optical transmission systems and photonic components

VPIphotonics Design Suite Version 11.1 provides access to professional application-specific simulation tools and several pluggable toolkit extensions with common usability, design process, and data analysis capabilities.

Version 11.1 offers advances in simulation and design flow for applications using probabilistically shaped QAM with polarization multiplexing, Digital Signal Processing, PAM4 signaling, transient SPICE simulations, integrated optical modulators, multimode fibers and couplers, and more.

VPIphotonics' software solutions have proven to be beneficial in winning and successfully performing many research and design projects — for commercial companies as well as for educational institutions.

"With the improved capabilities provided in Version 11.1, our modeling suite will continue to deliver industry-leading results that empower our users to define the cutting-edge," said André Richter, General Manager of VPIphotonics.
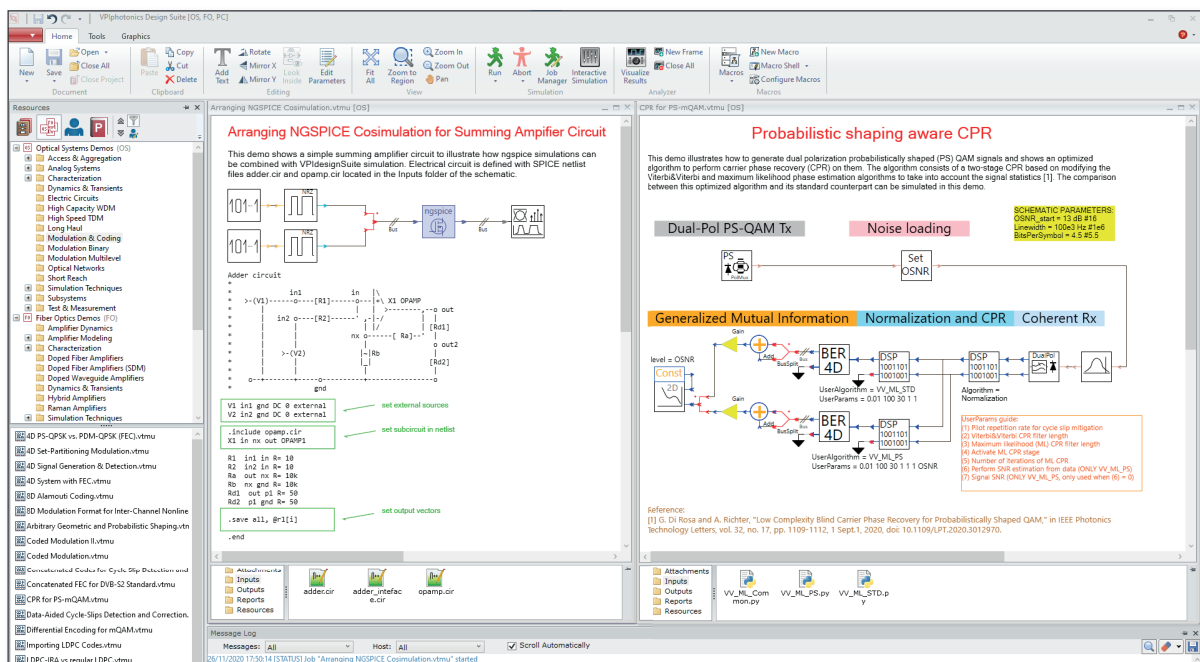
Photonic Design Environment (PDE) of Version 11.1

Short list of key features in Version 11.1

- **High-Order Modulation** — New global simulation parameters that specify the signal symbol rate, the number of simulated symbols and bits per symbol. They can be accessed by any module on the schematic.

- **Dual-Pol PS-mQAM Transmitter** — New dual-polarization (DP) transmitter module for convenient generation of probabilistically shaped m-ary quadrature amplitude modulation (PS-mQAM) encoded optical signals.

- **DSP: CPR for PS-mQAM** — New demonstration illustrating the application of an optimized DSP algorithm for the carrier phase recovery (CPR) of DP (PS-) mQAM signals.

- **DSP: TDE-MIMO** — Enhanced DSP algorithm for the time domain equalizer with multiple inputs multiple outputs (TDE-MIMO) to ensure compatibility with the external power normalization and to support the binary phase shift keying (BPSK) modulation format.

- **Bit-2-Symbol Mapping** — New application allowing to display and store (image and code file) the bit-to-symbol mapping of dual-polarized IQ-modulated optical channels.

- **PAM4 Metrics** — New instrumentation module for calculating important 4-ary pulse amplitude modulation (PAM4) signal metrics, such as EH6, EW6, OMA, Skew, Linearity, etc.

- **MRM for Optical Interconnects** — New system-level model for a microring modulator (MRM) that accounts for both electrical and optical characteristics. The physical and behavioral junction models simulate silicon-based MRMs with a depletion-type phase shifter or arbitrary user-defined MRMs.

- **SPICE simulations** — Support of transient SPICE simulations for detailed modeling of individual electronic devices (e.g., laser drivers, transimpedance amplifiers) and equivalent circuits of optoelectronic components (e.g., parasitic circuits, junction models).

- **Device Characterization** — Updated instrumentation modules for automated characterization of semiconductor optical lasers and amplifiers, optical modulators, and multimode VCSELs.

- **Control of Photonics Device Sections** — New macro that greatly simplifies the setting of parameter values for accurate time-domain simulations of photonic integrated circuits (PICs).

- **Block-2-Samples Conversion** — Easy creation of schematics that can switch between Block Mode and Sample Mode by changing a single control parameter.

- **Multimode Coupling** — Multimode coupler models that support advanced imaging systems with multiple optical elements (such as lenses, apertures, and spatial light modulators (SLMs)) separated by free-space propagation. A black-box imaging system model described by just the magnification value is available as well.

- **Multimode Fiber Characterization** — New test bench for measuring chromatic dispersion and dispersion slope of multimode fibers (MMFs) in accordance with the IEC 60793-1-42 standard.

- **Simplified Design Flow** — New macro for automatically adding null sources and ground terminations to any open module ports.

- **Python IDEs** — Intelligent code completion and context help is now available in Integrated Development Environments (IDEs, such as PyCharm, Visual Studio) when developing source code that uses VPIphotonics Python modules.
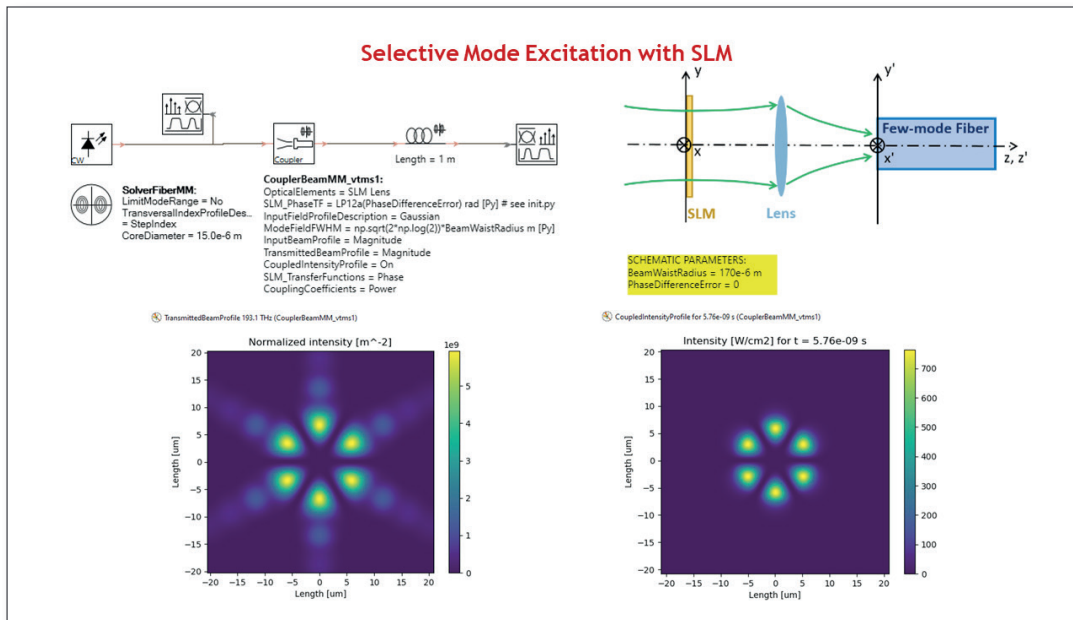
Design Example: Selective Mode Excitation with Spatial Light Modulator

This example illustrates how to simulate selective mode excitation using a multimode beam-to-fiber coupler module. An input Gaussian beam is transmitted through a free-space channel containing a phase spatial light modulator (SLM) and a lens.

The SLM phase mask represents the phase pattern of the LP mode, which should be excited in the fiber. The multimode coupler module calculates coupling coefficients to the fiber modes, as well as the input and transmitted beam intensity profiles and the intensity profile at the fiber facet observed after coupling. The step-index fiber has a core diameter of 15 um and supports 10 modes.

On the bottom we see how the input Gaussian beam is converted to an LP31-like field pattern using the phase-SLM followed by a lens and then coupled into the LP31 mode of a few-mode fiber.

Setup and results for selective mode excitation using a multimode beam-to-fiber coupler module

About VPIphotonics

VPIphotonics™ sets the industry standard for end-to-end photonic design automation comprising design, analysis and optimization of components, systems and networks. We provide professional simulation software supporting requirements of optoelectronics, integrated photonics and fiber optics applications, optical transmission system and network applications, as well as cost-optimized equipment configuration. Our team of experts provides professional consulting services addressing customer-specific design, analysis and optimization requirements, and delivers training courses on adequate modeling techniques and advanced software capabilities.

VPIphotonics' award-winning off-the-shelf and customized solutions are used extensively in research and development, and by product design and marketing teams at hundreds of corporations worldwide for 20+ years. Over 160 academic institutions joined our University Program enabling students, educators and researchers an easy access to VPIphotonics' latest modeling and design innovations.

For further information, please visit us at
www.VPIphotonics.com.