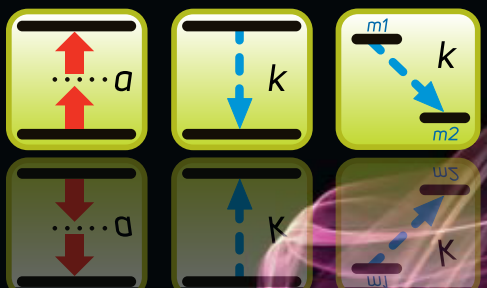
SimphoSOFT®

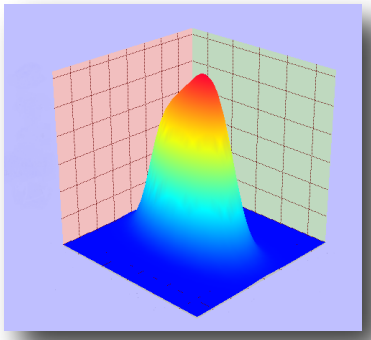
Powerful Photonics Modeling & Simulation Software

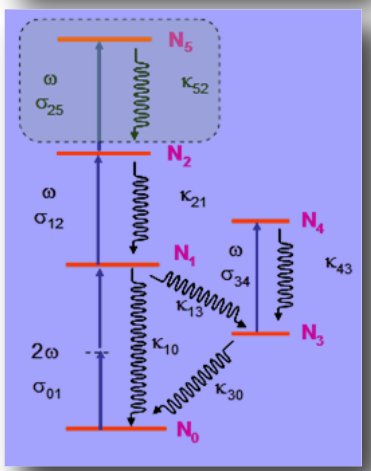


SimphoSOFT is a revolutionary CAD environment that permits generalized numerical simulations of the dynamic interaction of incident beams of coherent light with photonic materials. It avoids the tedious process of formulating mathematical equations and re-writing simulation code applicable for different classes of photoactivated materials and different experimental conditions.

Simphotek has invented graphical transition modules—symbolic representation of computational building blocks linking the GUI interface to the mathematical kernel—that replace the traditional process of code writing. Users can configure different coherent light sources and design virtual samples comprising multiple layers of materials where the test material layers are one or more photoactive species dispersed in a medium. Users define the material properties (index of refraction, single or multi-photon absorption coefficients, electron relaxation times, sample length, single or multiple combinations of different materials), electronic structure (desired number of energy levels, desired allowed photonic transitions), and laser wavelength and pulse width. SimphoSOFT then simulates laser beam propagation through the sample, giving time and location dependent field strength, dynamic population densities of every level, and plots of results.

With its novel CAD technology and easy to use GUI, SimphoSOFT makes interdisciplinary collaboration easy. You do not need to be an optics expert or invest heavily in modeling to obtain meaningful photophysical results which can be shared with biologists, medical personnel, engineers, materials scientists, chemists, optical scientist and physicists. SimphoSOFT reduces language barriers through its use of visual graphical methods.





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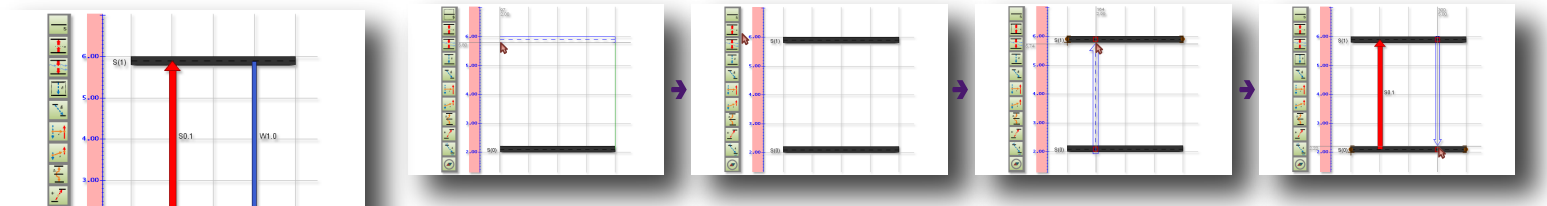
Benefits of Simpho**SOFT**:

- Eliminate writing tedious mathematical equations, programming and debugging. Focus on the physics of the problem at hand
- Reduce modeling time and cost by an order of magnitude
- Conserve internal software development resources
- Reduce or eliminate tedious and expensive laboratory experiments; mitigate or estimate risk of investment in unproven ideas
- Explore performance under various conditions
  cause-effect relationships
- Pre-screen materials before experimenting
- Avoid tedious and time-consuming literature searches to identify photophysical parameters of materials. Employ SimphoSOFT's easy to use and regularly updated Library of Materials Database for cataloging and sharing results with others
- Obtain exact material parameters from experiments results
- Model complex multi-layer materials
  e.g.: diffusion-bonded multisegment gain medium
- Guide materials development
  e.g.: codopant concentration control in rare-earth doped media
- Collaborate with interdisciplinary partners at home or abroad; share results with your collaborators on-line, anywhere and anytime
- Export complete files of your simulations to other commercial or in-house software
  e.g.: port Z-scan results to ray tracing program
- Wide, multidisciplinary applicability of modeling tool: optics, physics, engineering, biology, medicine, materials science, etc.
  e.g.: rare-earth doped optical gain media, nonlinear absorbers fluorescent probes, photodynamic therapy, etc
- Enable even a non-expert in photonics/chemical dynamics to leverage photophysics in solving a wide array of technical challenges
- Use as a learning or teaching tool for many facets of light-matter interactions
- Chart a future path for matching the growing complexity of photophysics challenges with the growing availability of computing power. SimphoSOFT's core technology is poised to leverage the economies of scale offered by Cloud Computing

Features of Simpho**SOFT**:

- Simphotek computational transition modules that integrate a Jablonsky energy level diagram of arbitrary complexity into the simulation model
- Computational optical building blocks for:
  - Single and multiphoton absorption
  - Excited state absorption
  - Energy transfer
  - Upconversion
  - Stimulated emission (one or more photons)
  - Cross-relaxation
  - Radiative and non-radiative relaxation
  - Auger recombination
  - Photobleaching
  - Chemical reactions
- Other optical effects:
  - Kerr lensing
  - Background absorption
  - Diffraction
  - Reflection
- Stimulates laser-material experiments:
  - Laser transmission
  - Laser signal gain/amplification
  - Saturable absorption, power limiting
  - Z-scan measurements
  - Pump-probe measurements
  - Fluorescence and phosphorescence intensity
  - Lifetime measurements
  - Time-dependent population of quantum states
- Optical input:
  - CW
  - Single-pulse or multiple-pulse:
    Gaussian, $Sech^2$ and square-like temporal profile
  - Single-wavelength or multi-wavelength
  - Radially symmetric Gaussian profile incident beams
- Optical material bulk properties:
  - Multiple absorbers, multiple layers can be simulated
- Optimization of photophysical or experimental parameters
- Database of photophysical parameters:
  - Library of common photo-active materials
- Smooth, user-friendly GUI CAD environment for rapid, easy and intuitive input and control of materials, parameters, optical sources and experimental configurations
- Simulation Output:
  - Extensive set of clear, versatile graphical output options
  - Convenient interface for porting results of simulations to other modeling software and applications.



SimphoSOFT: adding absorption and relaxation transitions

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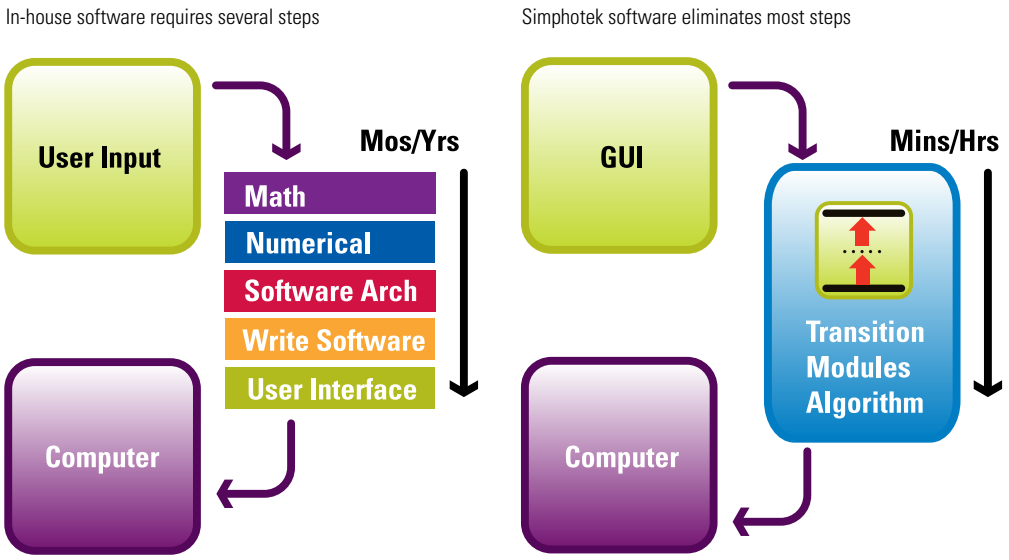
How it works

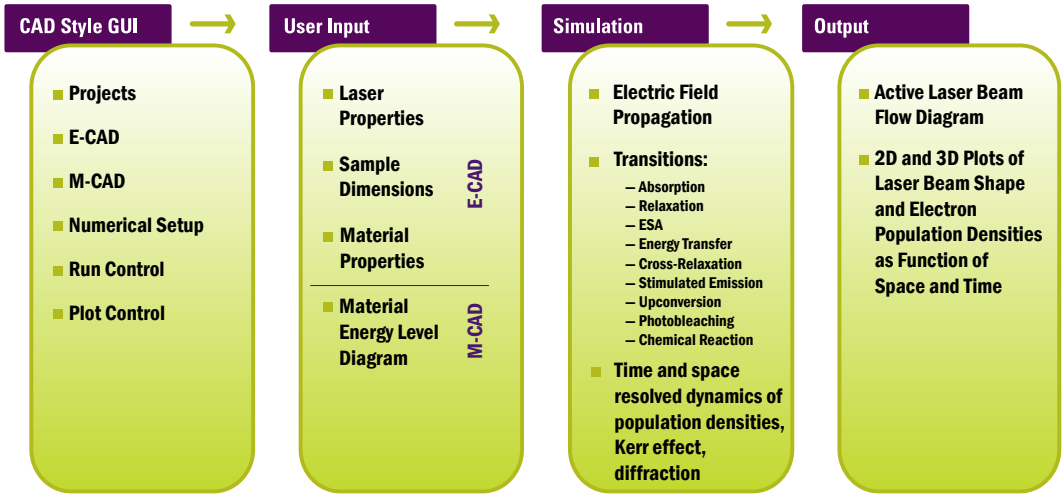
SimphoSOFT® consolidates multiple steps of traditional photophysical simulations into a simplified, graphical process of defining energy levels and materials properties. The generalized numerical engine within SimphoSOFT then does the heavy lifting.

Simphotek Automation Technology



SimphoSOFT Structure

- Easy to use GUI
- Multiple simulation features
- Multiple plots of results



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