Overview PhoeniX software

How to design a photonic chip?

Marcel Zeiler

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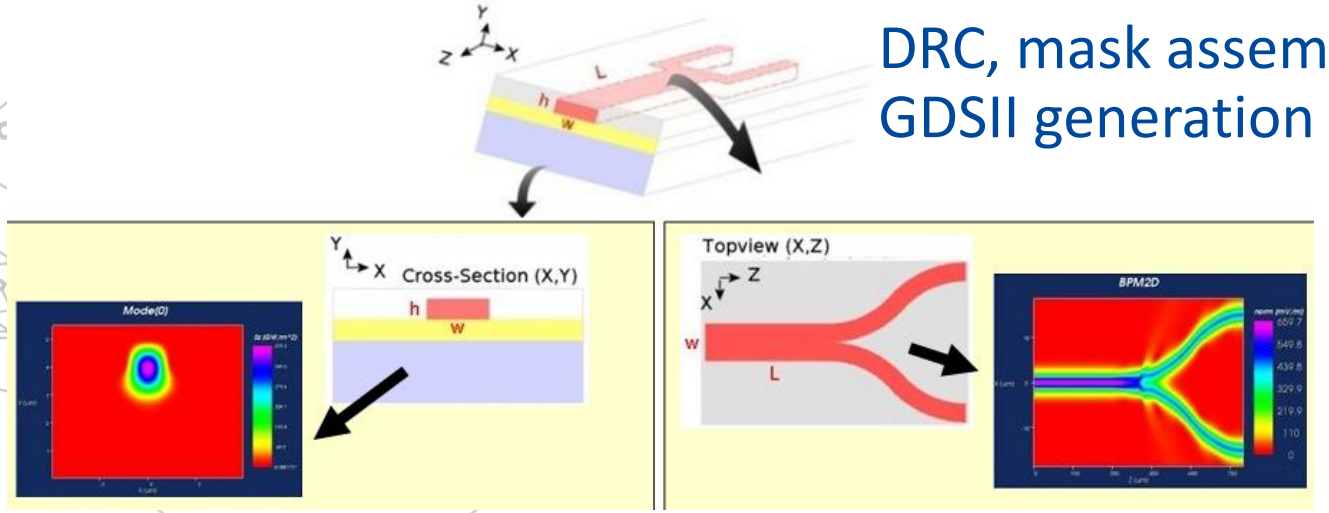
Outline

- PhoeniX's software packages
- Process Design Kits (PDKs) with PhoeniX software
- Example: How to design a Multimode-Interference-Coupler (MMI)

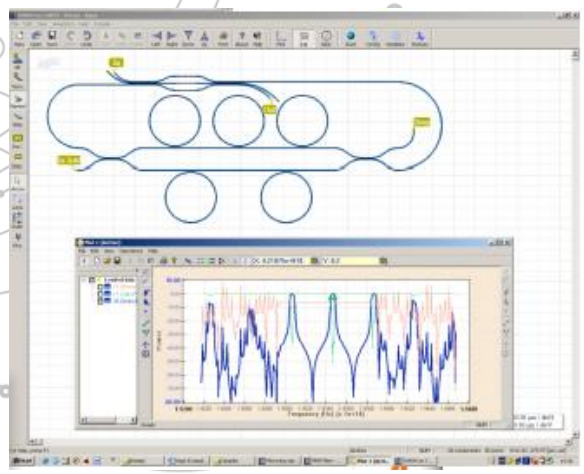
PhoeniX Field- & OptoDesigner

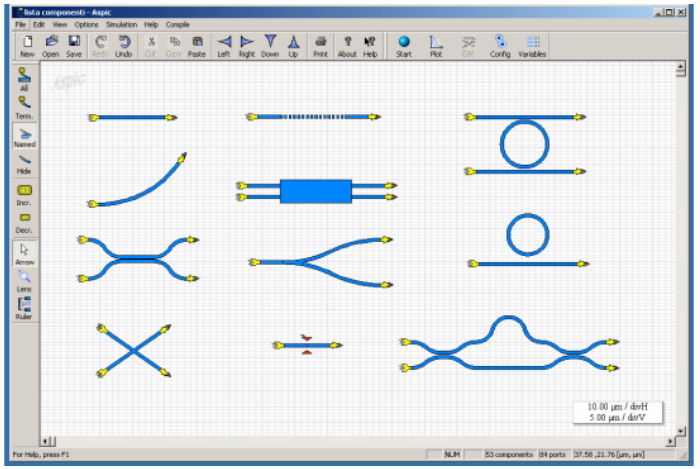
- FieldDesigner
  - FD and FMM mode solver (straight and bend waveguides)
  - TO, EO, 3D ring resonator
- OptoDesigner
  - Mode propagation simulation (BPM, BEP, FDTD)
  - object oriented mask layout
  - Automation for Functional DRC, mask assembly and GDSII generation



Filarete ASPIC

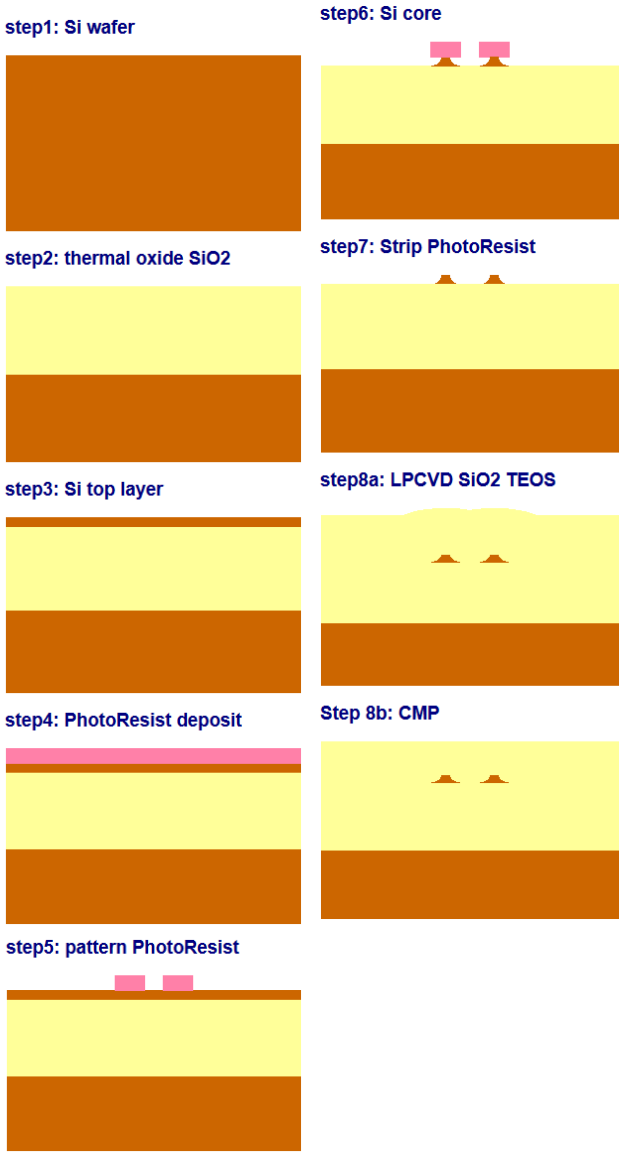
- Integrated photonics circuits simulation and design
- Allows analysis of larger / more complex circuits
- Response in spectral domain
  - Calculates amplitude, phase, group delay, dispersion, and polarization
- ASPIC comes with a large library of modules
  - Waveguides, bends, MMI's, rings, DC, splitter, MZ, phase modulator, crossings





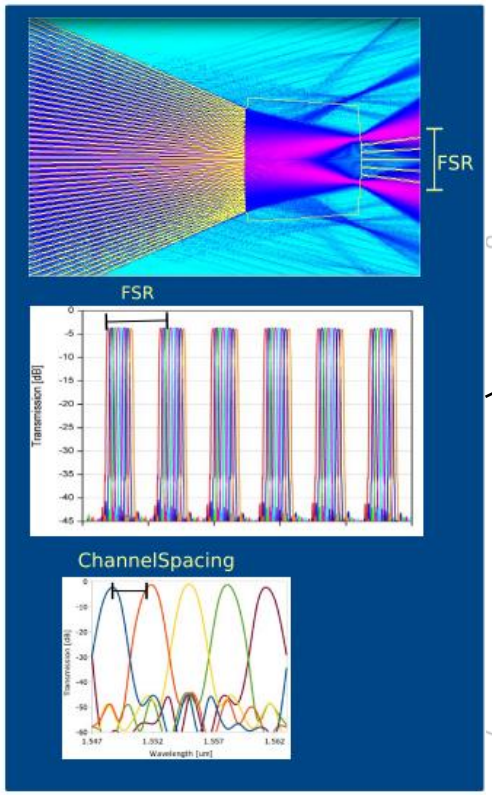
PhoeniX FlowDesigner

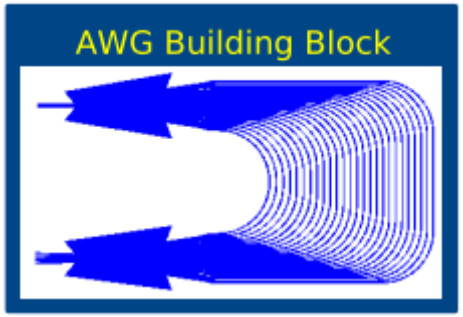
- Process flow virtualization
  - Based on process flow
  - Visualize cross section
- Library of different recipes & models
- Benefits
  - Essential for process development
  - Avoids costly mistakes
  - Improves yield

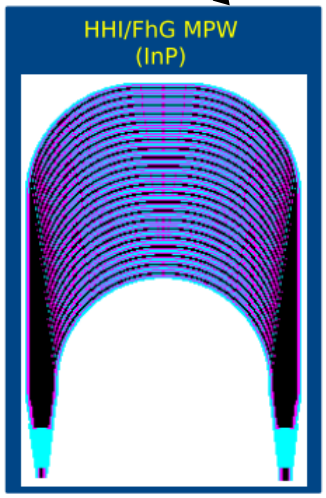


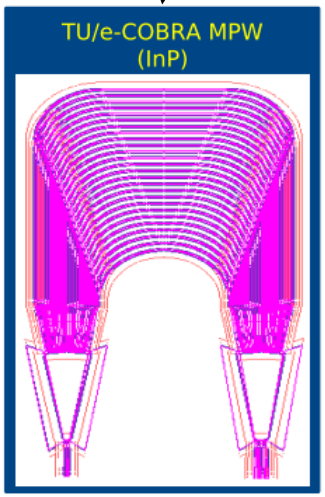
Building blocks from PDKs

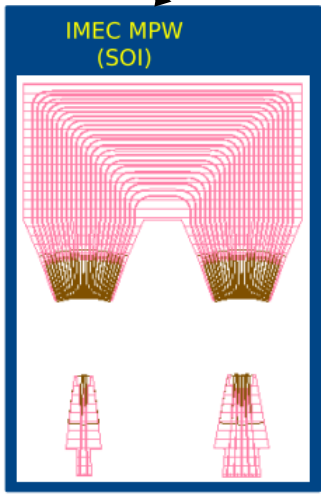
- Select technology
- Define specs
- Perform simulation
- Generate Design



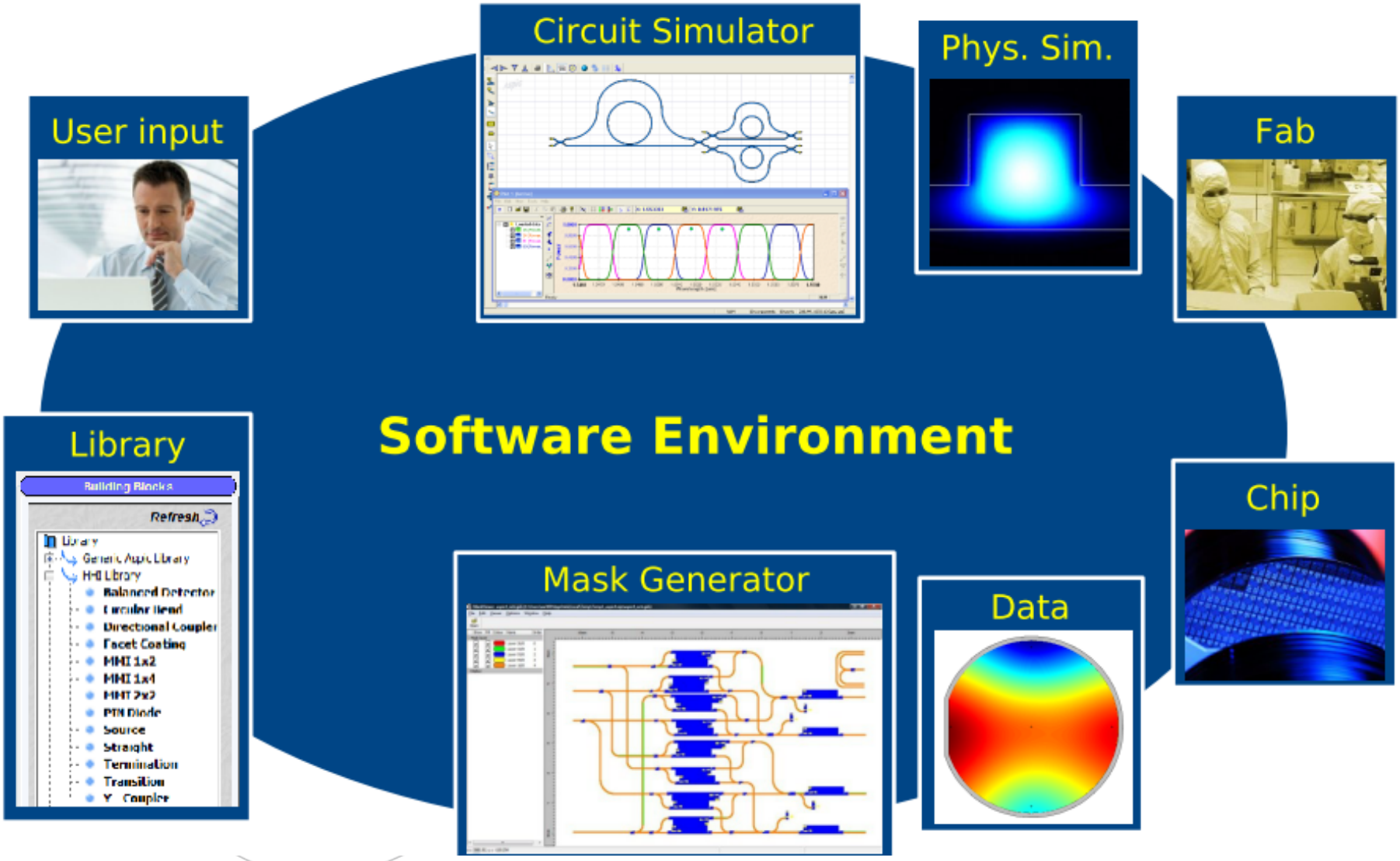








Integration of all different modules



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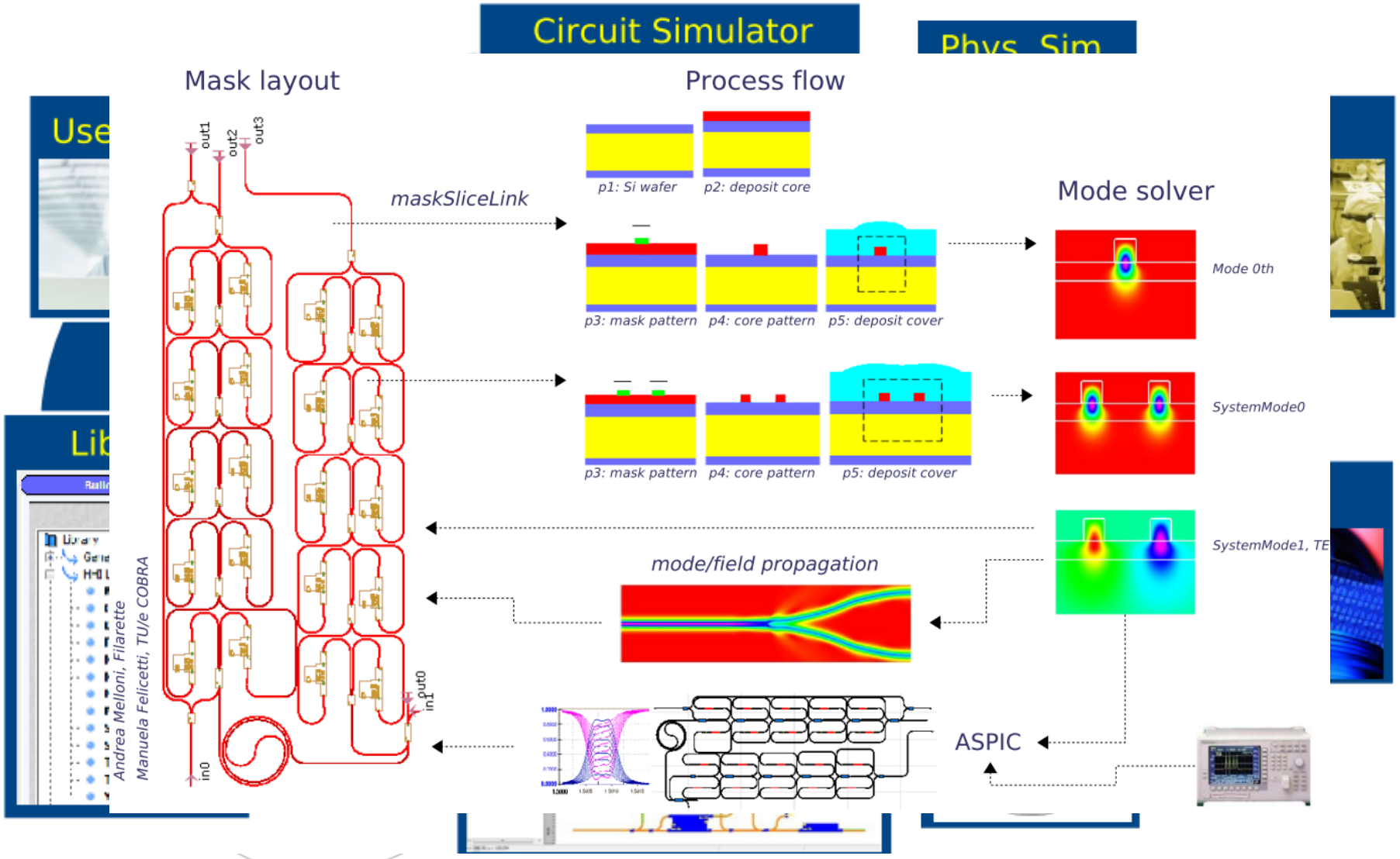
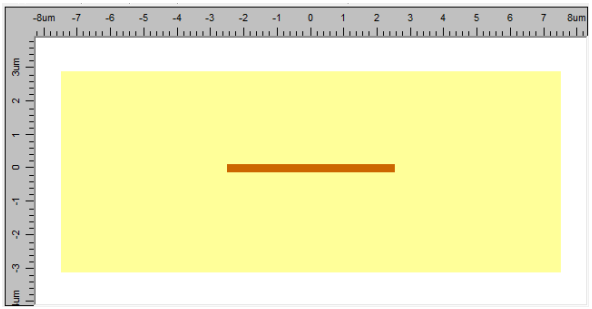
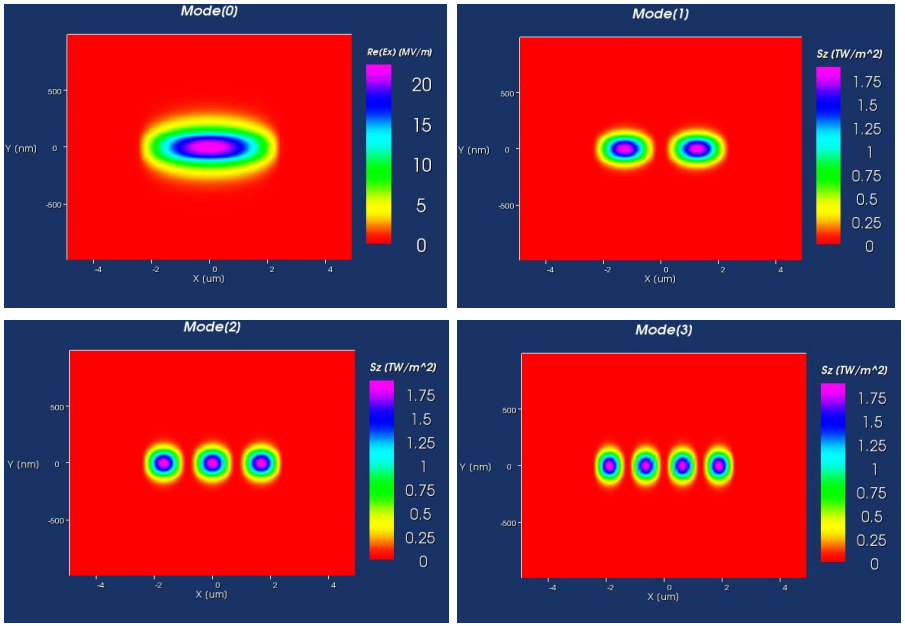


Example: How to design an 1x2 MMI 1

1. Define waveguide (WG): width, height, material
2. Create WG cross-section in FieldDesigner (FD)
3. Set up simulation (algorithm, calculation window)
4. Find number of modes and their eff. refractive index for MMI's width with FD





Example: How to design an 1x2 MMI 2

5. Import data from FD to OptoDesigner (OP)
6. Create top view of device in OP
7. Set up simulation
8. Use BPM simulation to find field distribution in MMI
9. Optimize MMI length, output port gap
10. Export mask