Parameter optimization for nano-structure
Meta-atom example

PlanOpSim
Enlightened Planar Optics
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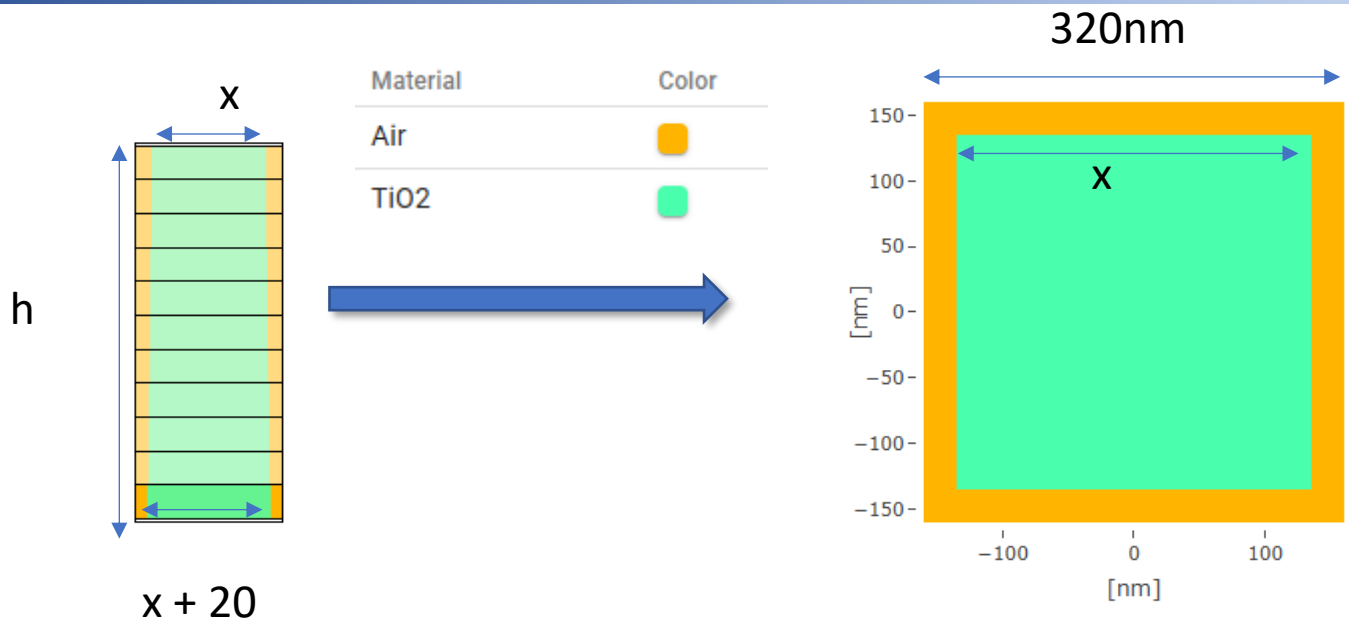
Aim of these slides

- Designing parametrized meta-atoms
  - Solution space with many parameters
  - Brute force sweeps are time consuming
  - Speed up parameter searches with optimization algorithms
- This example shows:
  - Setting up a nano-structuree optimization
  - Designing a meta-atom library
  - Co optimization for high transmission, $360°$ phase sampling, manufacturability
  - Apply manufacturing constraints
- This library can then be applied to:
  - Design meta-surface using PlanOpSim

Meta-atom geometry



- Width (x) varied in to control optical phase accumulation
- Optimization takes into account:
  - Manufacturable sizes: set optimization limit according to critical dimension
  - Sidewall angle modelled as stacked layers in RCWA
- H has to be the same for every pillar (in this example H =600nm)
- Number of layers such that: $\Delta h < \frac{\lambda}{10}$

Structure configuration depends on what is manufacturable

Parameter optimization

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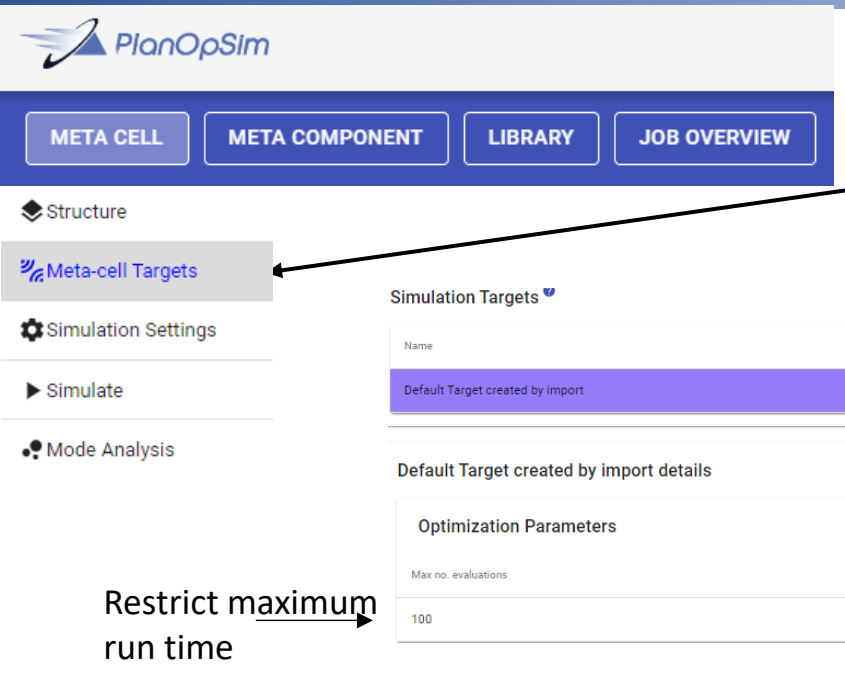
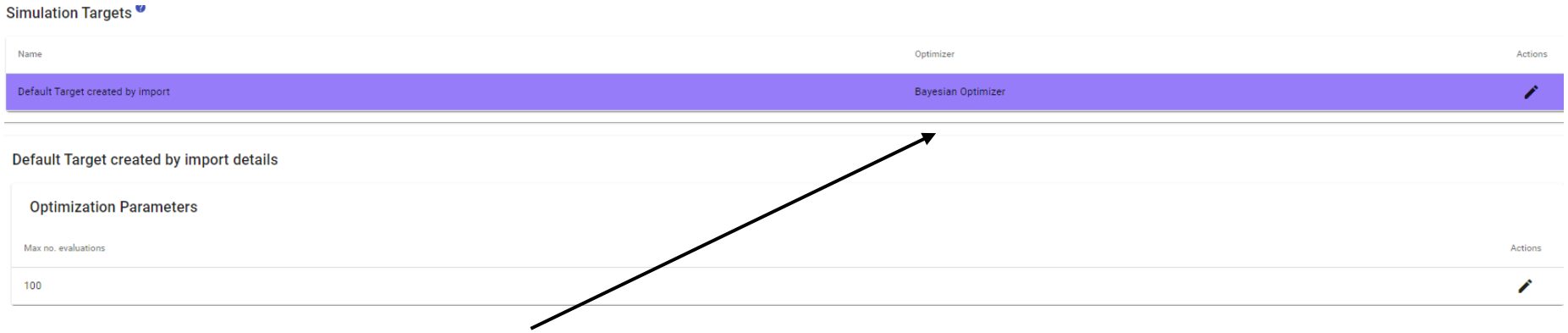


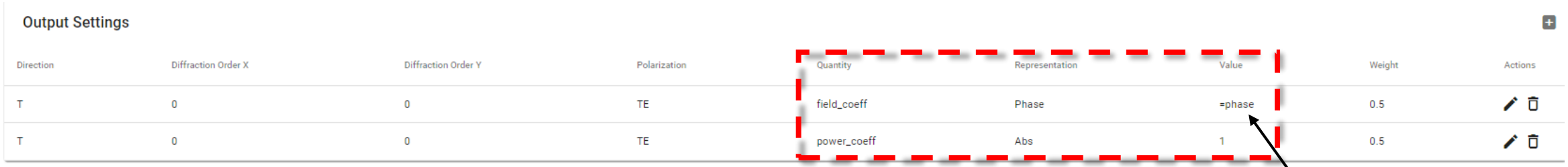
Set target in Meta-cell targets



Restrict maximum run time

1) Select optimization method

2)Set transmission power and phase as target

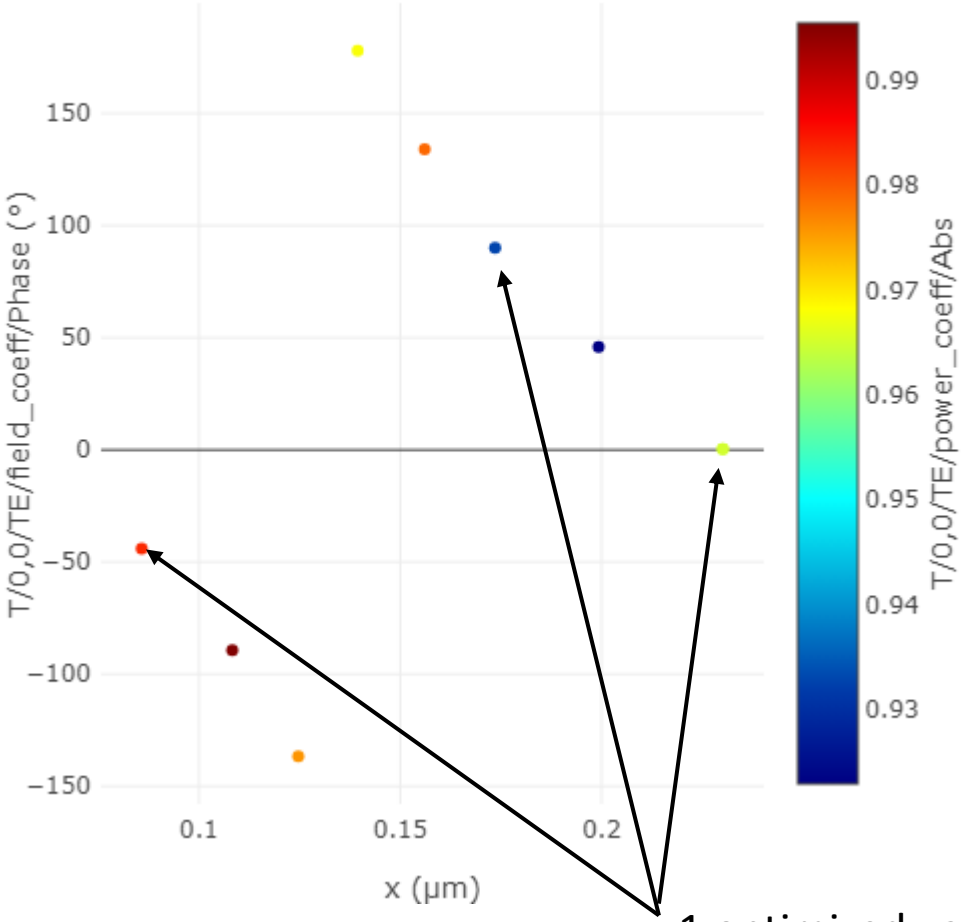


3) Run simulation to optimize for transmission and phase

An optimization is carried out for each value of the phase variable

Meta cell optimization result

Fix component height and width



1 optimized value per target phase

- Phase from -180 to 180°
- Width optimized
- Structures can be added as a group for meta-surface design

Contact info

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