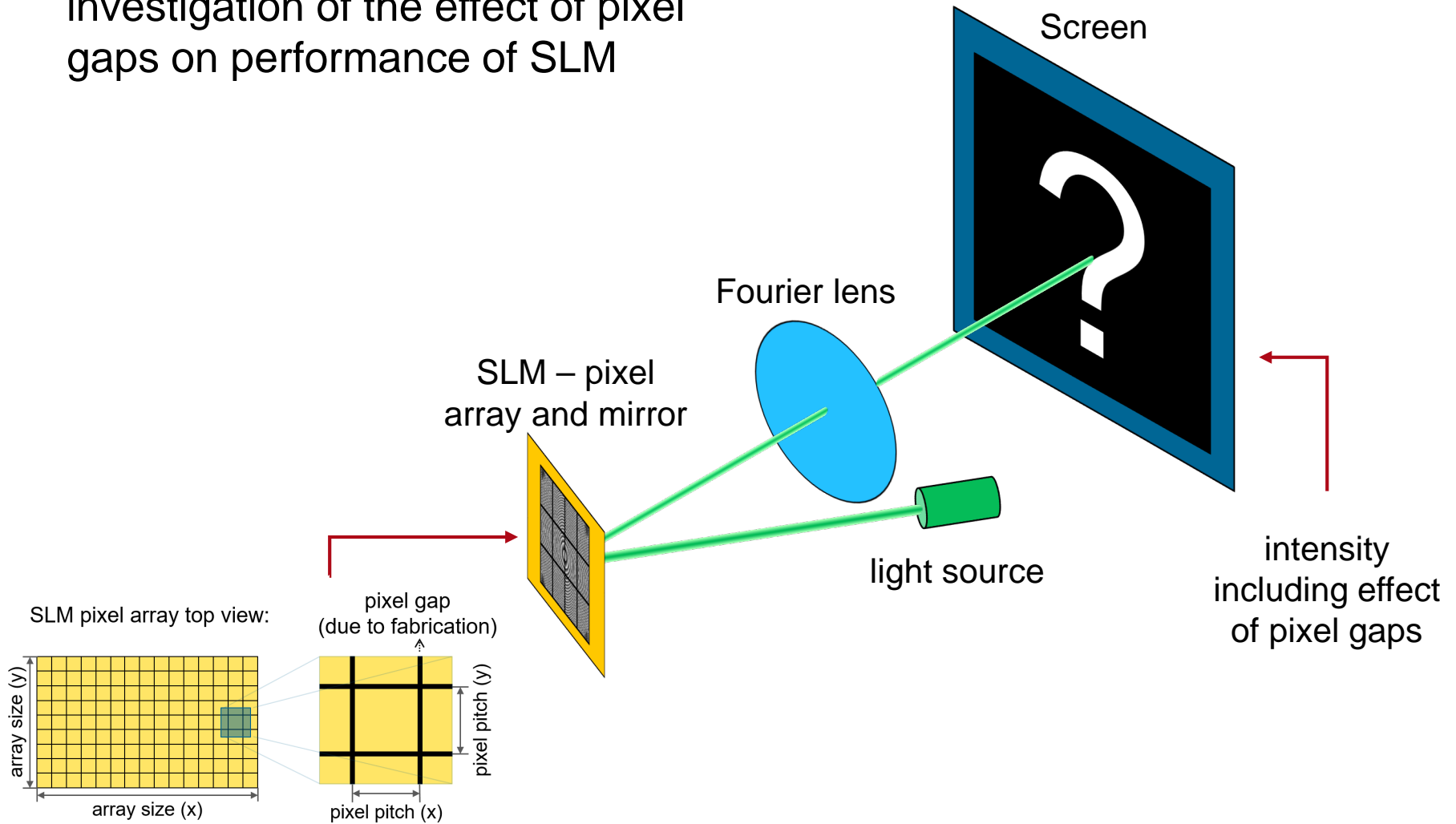


Light Shaping > Diffractive Optics

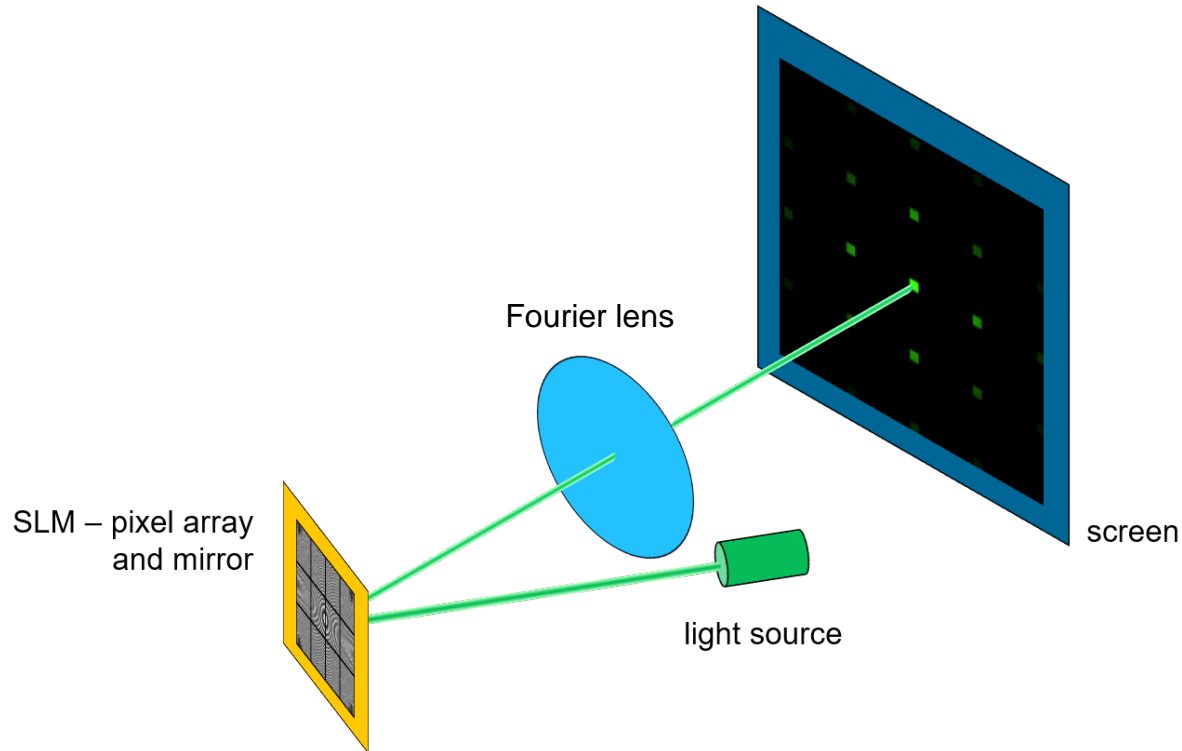
Simulation of Light Diffraction at Pixels of a Spatial Light Modulator

Task/System Illustration

investigation of the effect of pixel gaps on performance of SLM

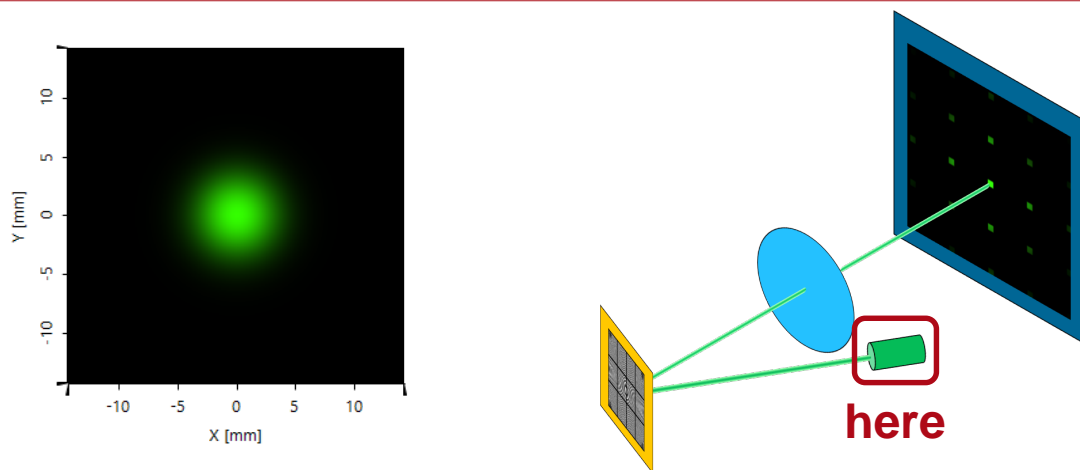


Highlights



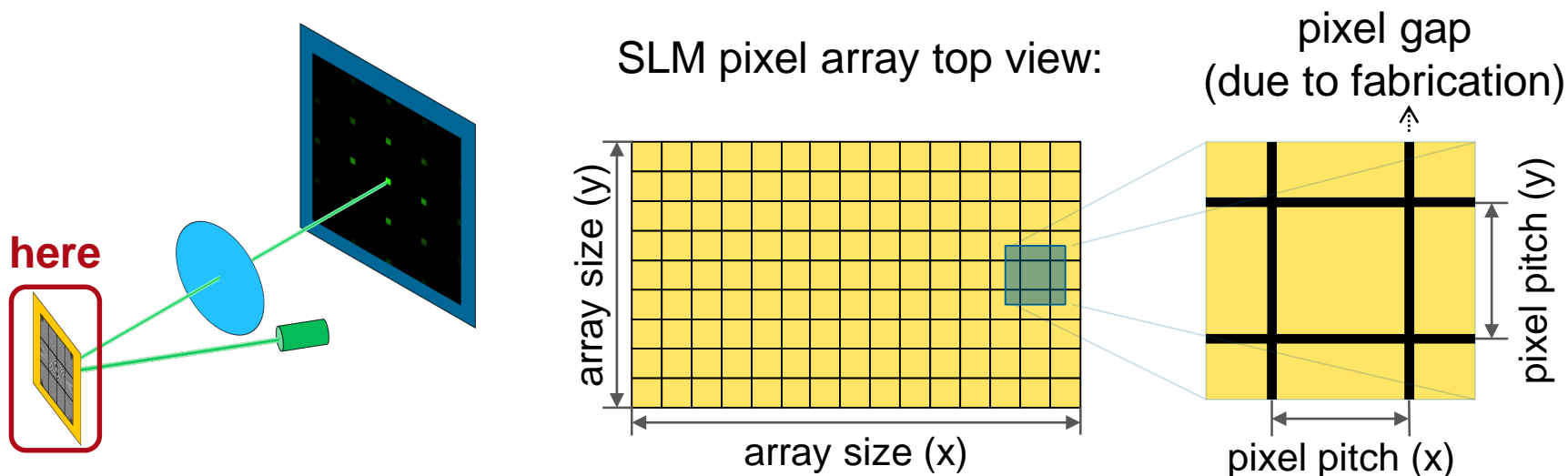
- simulation of light shaping using a spatial light modulator (SLM)
- investigation of influence of the non-functional gaps between the SLM pixels

Specification: Light Source



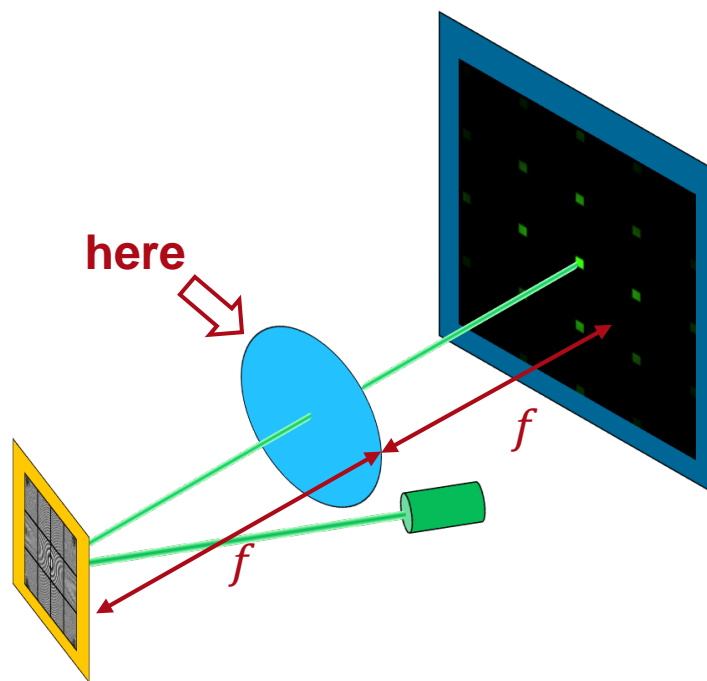
Parameter	Description / Value & Unit
type	single mode laser
mode	single Hermite Gaussian (0,0) mode
diameter	6.6mm (referring to $1/e^2$)
wavelength	532nm
polarization	linear in x-direction (0°)
beam divergence	$0.003^\circ \times 0.003^\circ$ (referring to $1/e^2$)
initial M^2 in x- and y-direction	1.0×1.0

Specification: SLM Pixel Array



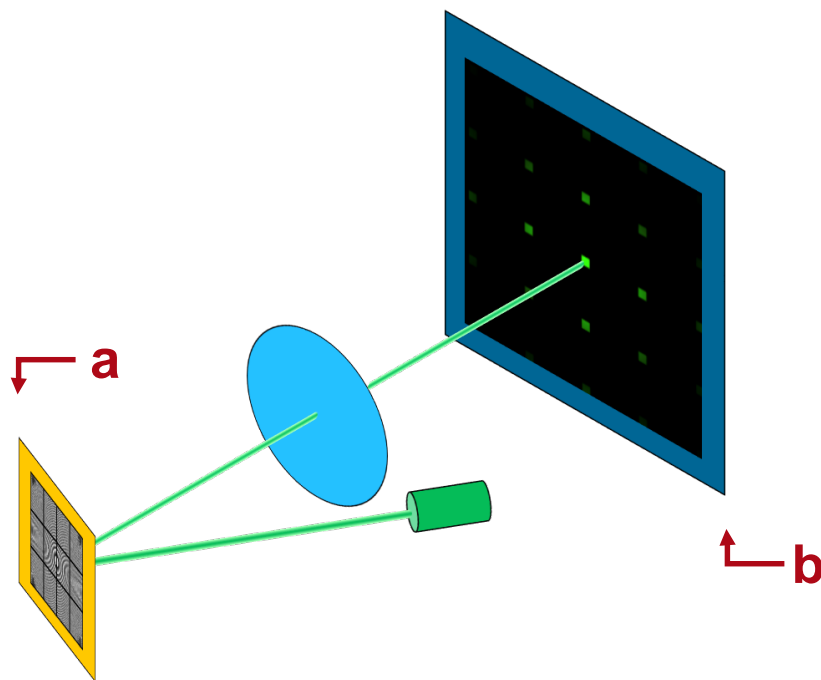
Parameter	Description / Value & Unit
type & model	Hamamatsu X10468
pixel pitch	20 μ m x 20 μ m
area size	15.84mm x 12.0mm
area fill factor	98% (varied to illustrate effect, e.g. 60%)
element tilt with respect to optical axis	10°
pixel pitch	20 μ m x 20 μ m

Specification: Fourier Lens



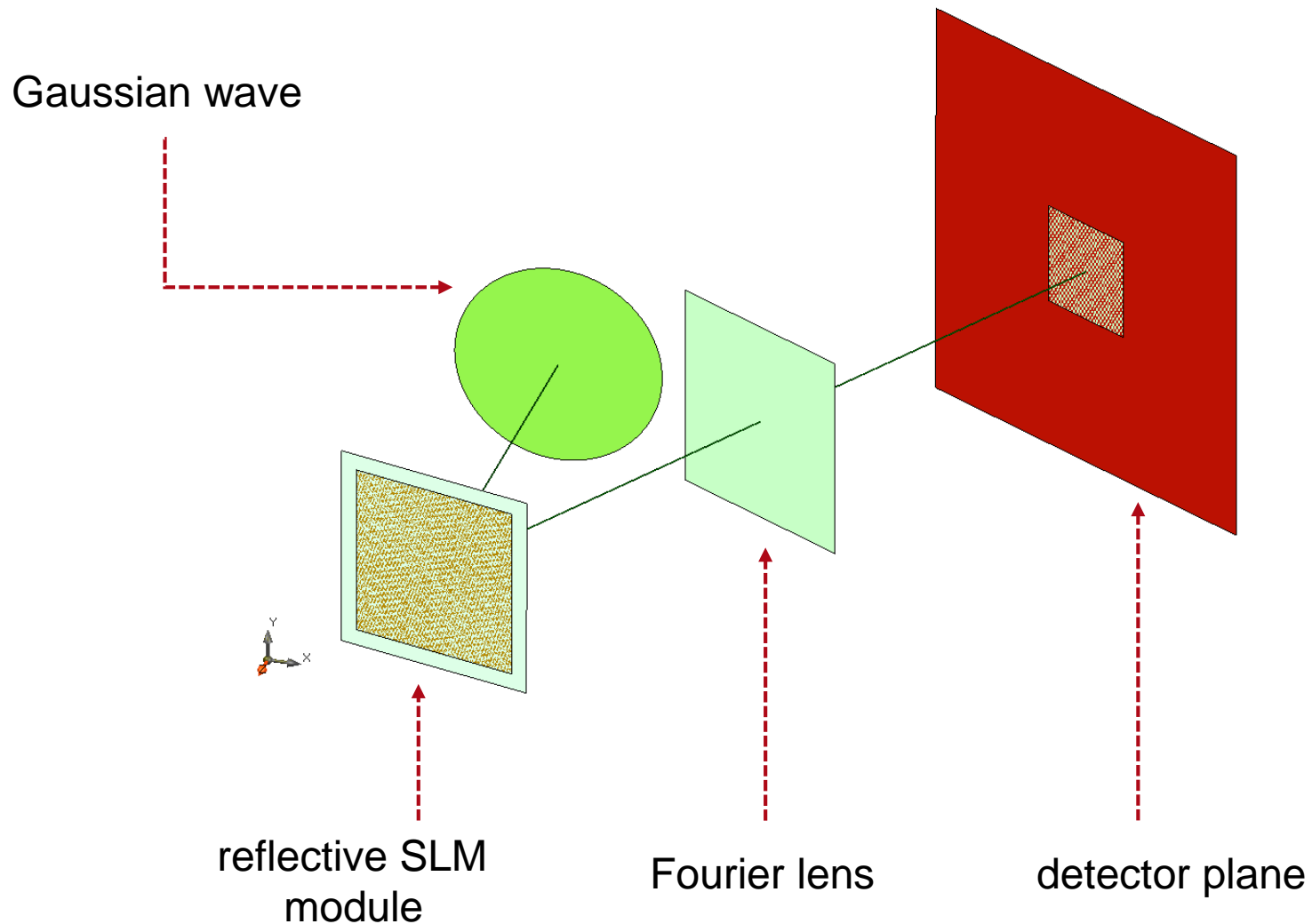
Parameter	Description / Value & Unit
type	2f setup
eff. focal length	50mm (f)

Specification: Detector



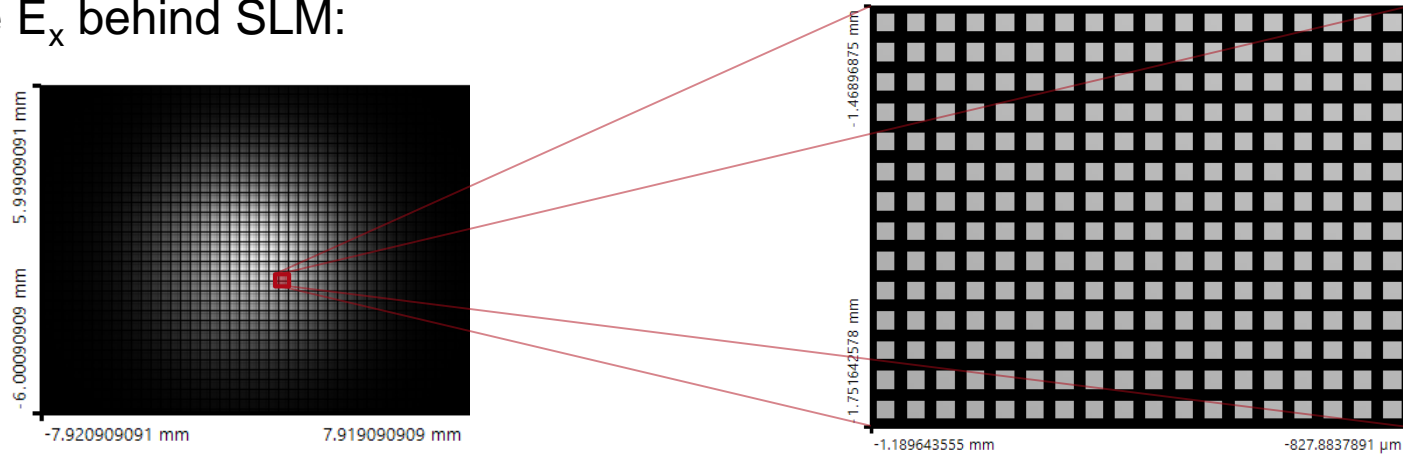
Position	Modeling Technique	Detector/Analyzer
full system	3D System View	3D system visualization
a	field tracing	amplitude and phase in near field of SLM module
b	field tracing	amplitude and intensity in far field of SLM module

Result: 3D System View

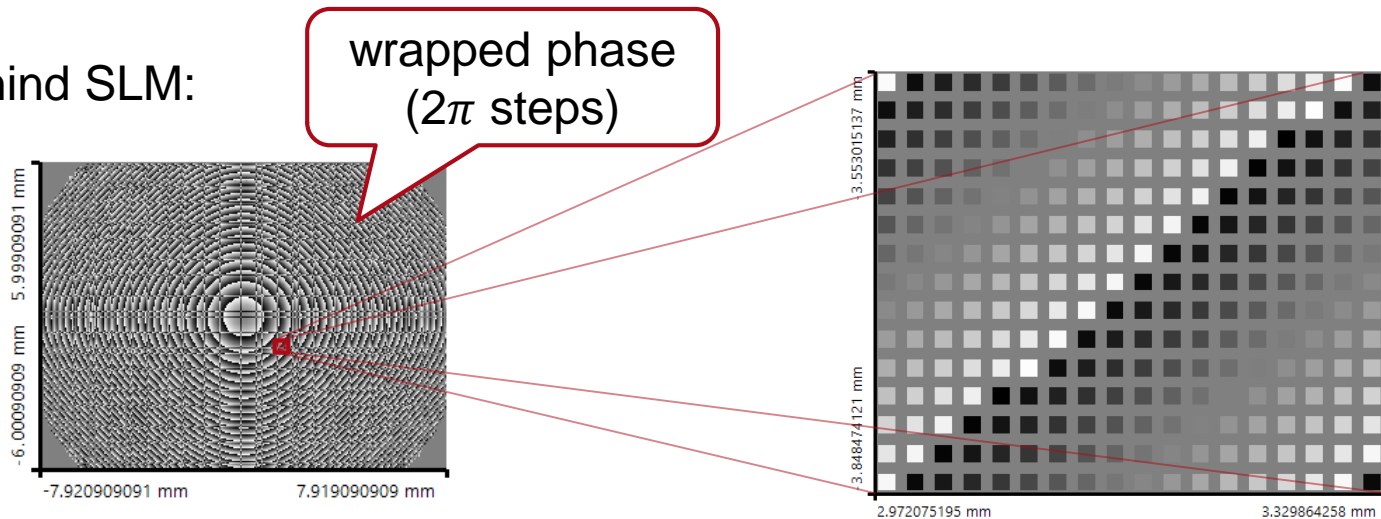


Result: Near Field of SLM

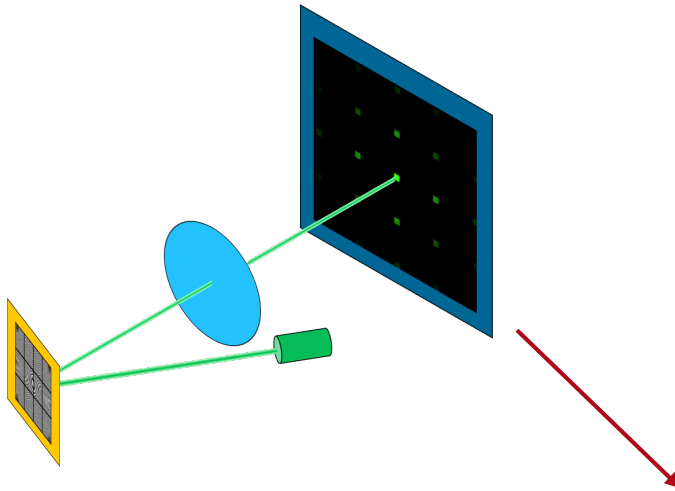
amplitude E_x behind SLM:



phase behind SLM:



Result: Far Field of SLM

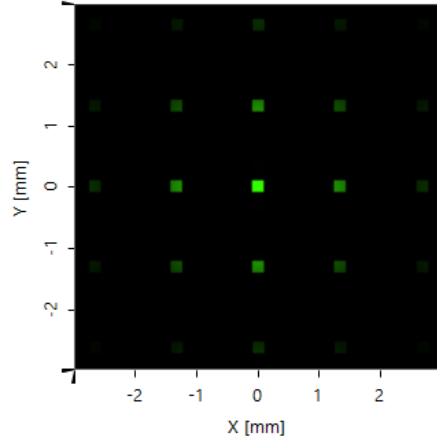


“area fill factor”:

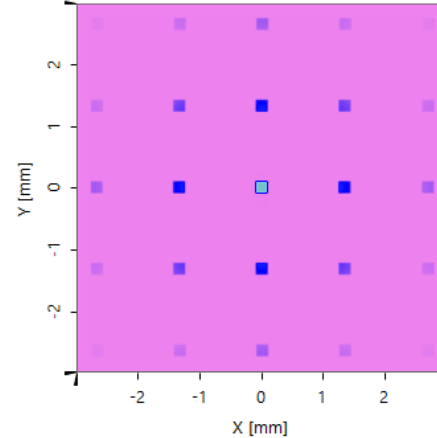
$$F = \frac{\text{effective area}}{\text{array area}}$$

60% area fill factor

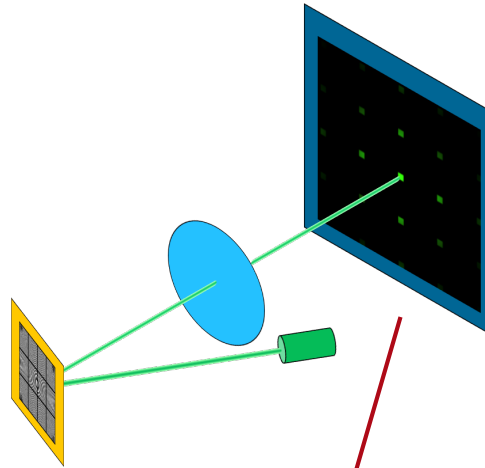
Visual perception



Amplitude

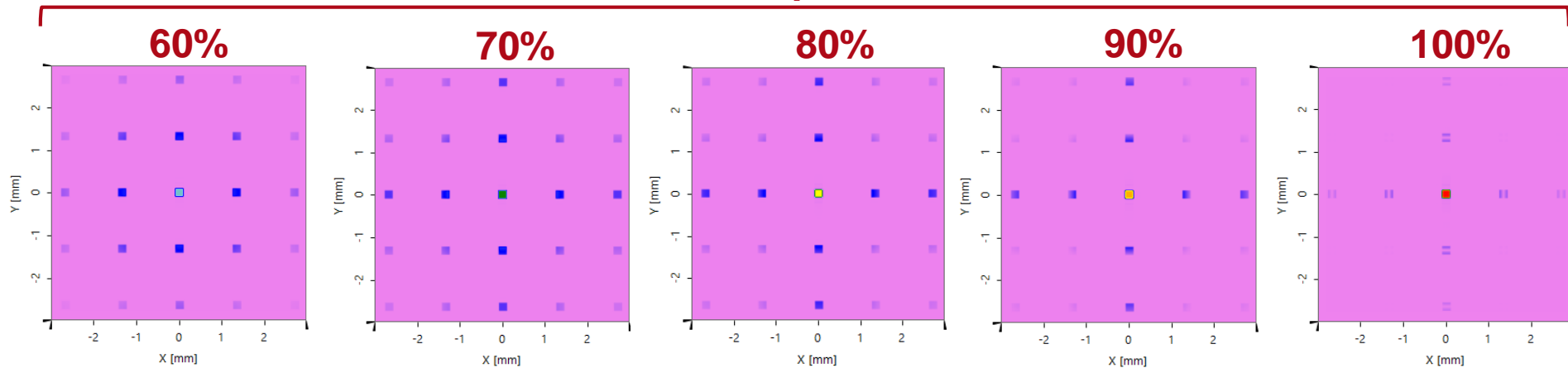


Result: Far Field of SLM



variation of area fill factor:
(identical color scaling)

Amplitude



Document & Technical Info

code	DO.0006
version of document	1.0
title	Simulation of Light Diffraction at Pixels of a Spatial Light Modulator
category	Diffraction Optics (DO)
created by	Stefan Steiner (LightTrans)
VL version used for simulations	7.0.0.29

Specifications of PC Used for Simulation

Processor	i7-49010MQ (4 CPU cores)
RAM	32GB
Operating System	Windows 10