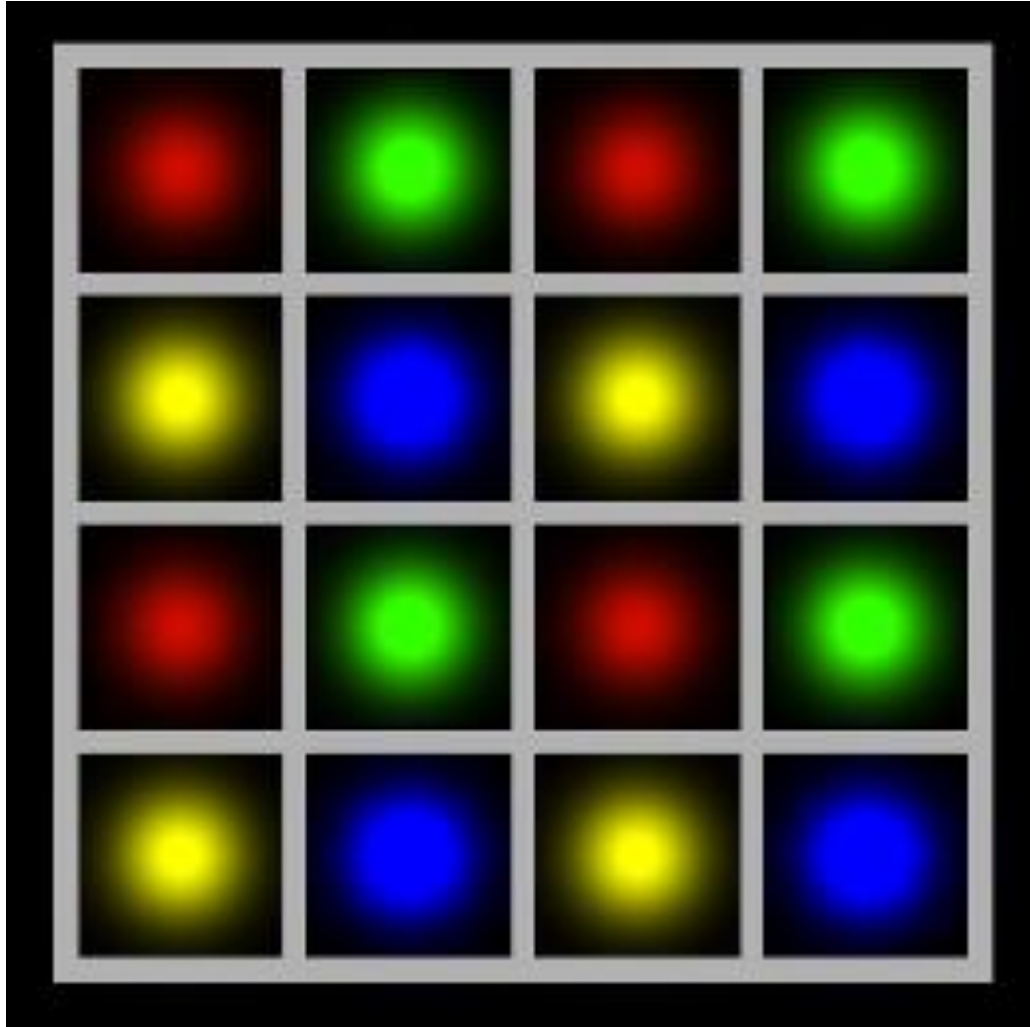


Simulation of Multiple Light Sources with VirtualLab Fusion

Abstract

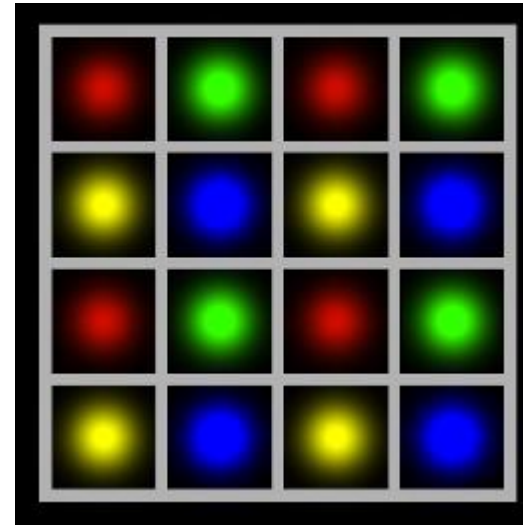


Being able to include multiple light sources in a system is fundamental for many applications, like imaging or illumination. VirtualLab Fusion provides advanced options to tackle these challenges. In this document, we provide a brief overview of how to set up multiple light sources and give several simulation examples.

Overview

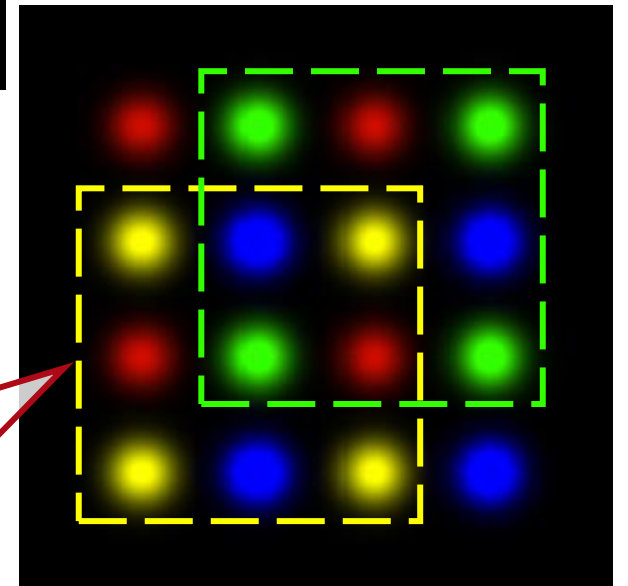
The Multiple Light Source

- can contain an arbitrary number of primary light sources.
- supports all *Partially Coherent Light Sources* (except *Panel Type* and *Scanning Source*).
- supports coherent combination for polychromatic primary light sources.



4x4 multicolor light matrix

Combination of the Grid
Gaussian Planar Source
with different wavelengths

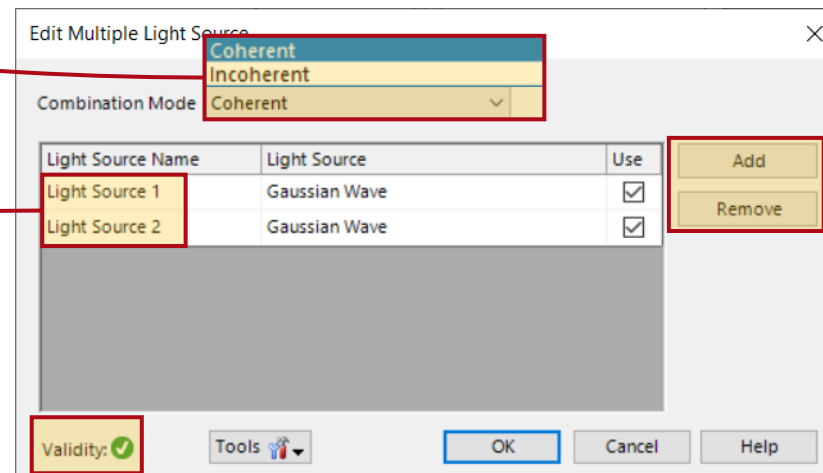


Configuration of the Multiple Light Source

Click here to edit the coherence between the modes

Click here to add or remove light sources

Light sources are identified by customizable names

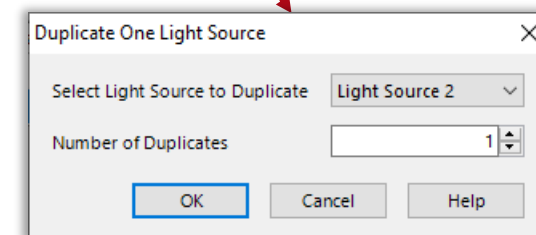
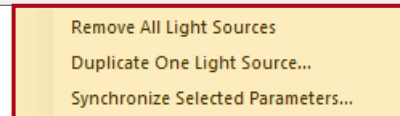
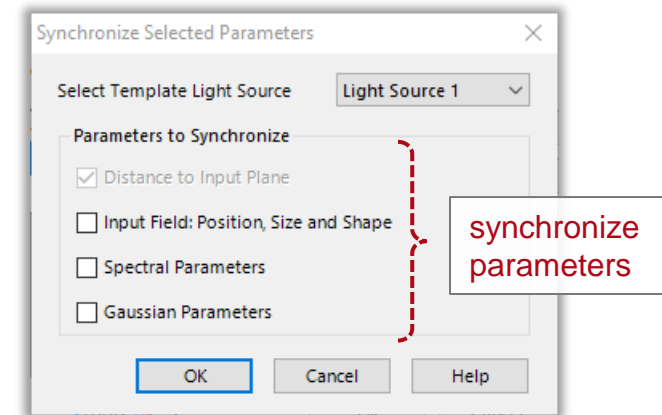
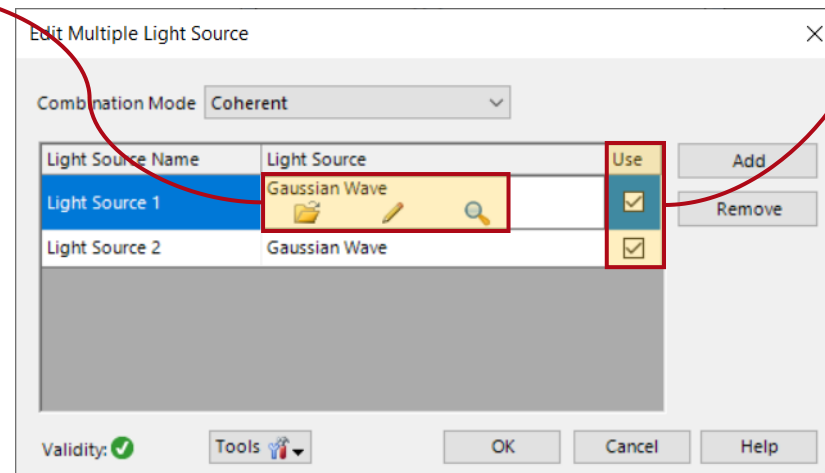
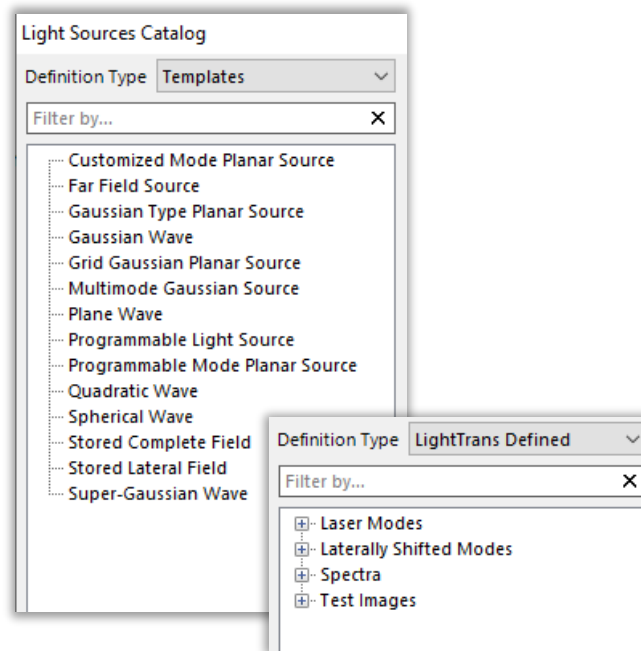


Get validity information to check whether there are issues with the current configuration

Configuration of the Multiple Light Source

Load light source from source catalog, then edit and view parameters

Easily activate and deactivate individual sources



Use Parameter Coupling to Link Parameters

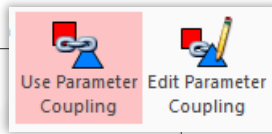
Edit Parameter Coupling

Parameter Specification
Setup the parameter(s) to be used as input (independent variable) and output (dependent variable) of the coupling snippet.

Filter by... X Show Only Used Parameters

1 2 ^	Object	Category	Parameter	Use in Snippet	Short Name	
		Light Source 1 (Gaussian Wave)	Wavelength	<input type="checkbox"/>	Wavelength (# 1)	
			Weight	<input type="checkbox"/>	Weight (# 1)	
			Polarization Angle	<input type="checkbox"/>	Polarization Angle (# 1)	
			Distance to Input Plane	<input type="checkbox"/>	Distance to Input Plane (# 1)	
			Lateral Offset X	<input checked="" type="checkbox"/>	Lateral Offset X (# 1)	
			Lateral Offset Y	<input checked="" type="checkbox"/>	Lateral Offset Y (# 1)	
			Number of Rays X	<input type="checkbox"/>	Number of Rays X (# 1)	
			Number of Rays Y	<input type="checkbox"/>	Number of Rays Y (# 1)	
			Oversampling Factor	<input type="checkbox"/>	Oversampling Factor (# 1)	
			Field Size Factor	<input type="checkbox"/>	Field Size Factor (# 1)	
			Relative Edge Width	<input type="checkbox"/>	Relative Edge Width (# 1)	
			Order X	<input type="checkbox"/>	Order X (# 1)	
			Order Y	<input type="checkbox"/>	Order Y (# 1)	
		"Combined Light Source" (# 0)	Waist Radius X (1/e^2)	<input type="checkbox"/>	Waist Radius X (1/e^2) (# 1)	
			Waist Radius Y (1/e^2)	<input type="checkbox"/>	Waist Radius Y (1/e^2) (# 1)	
			Offset between x- and y-...	<input type="checkbox"/>	Offset between x- and y-Plane (# 1)	
			Light Source 2 (Gaussian Wave)	Wavelength	<input type="checkbox"/>	Wavelength (# 2)
				Weight	<input type="checkbox"/>	Weight (# 2)
				Polarization Angle	<input type="checkbox"/>	Polarization Angle (# 2)
				Distance to Input Plane	<input type="checkbox"/>	Distance to Input Plane (# 2)
				Lateral Offset X	<input checked="" type="checkbox"/>	Lateral Offset X (# 2)
				Lateral Offset Y	<input checked="" type="checkbox"/>	Lateral Offset Y (# 2)
				Number of Rays X	<input type="checkbox"/>	Number of Rays X (# 2)
				Number of Rays Y	<input type="checkbox"/>	Number of Rays Y (# 2)
				Oversampling Factor	<input type="checkbox"/>	Oversampling Factor (# 2)
				Field Size Factor	<input type="checkbox"/>	Field Size Factor (# 2)
		Relative Edge Width		<input type="checkbox"/>	Relative Edge Width (# 2)	
		Order X		<input type="checkbox"/>	Order X (# 2)	
		Order Y		<input type="checkbox"/>	Order Y (# 2)	
		Waist Radius X (1/e^2)	<input type="checkbox"/>	Waist Radius X (1/e^2) (# 2)		
		Waist Radius Y (1/e^2)	<input type="checkbox"/>	Waist Radius Y (1/e^2) (# 2)		
		Offset between x- and y-...	<input type="checkbox"/>	Offset between x- and y-Plane (# 2)		

Help Validity: < Back Next > Finish



The Parameter Coupling feature is able to link the parameters of all the sources together, so that there is no need to define those parameters repeatedly.

Select parameters to be coupled

Define how the parameters shall be coupled

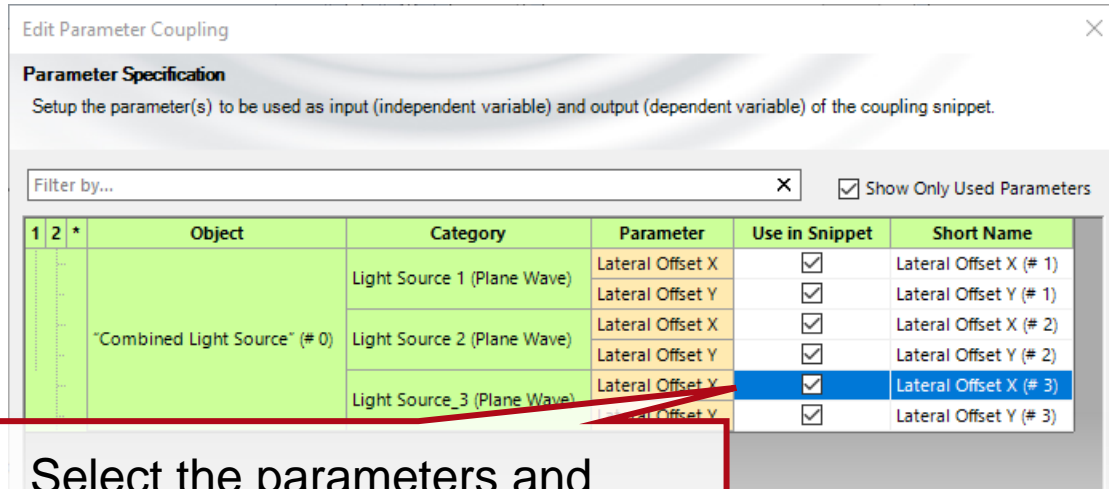
Edit Parameter Coupling

Snippet Specification
Define the snippet which does the actual parameter coupling.

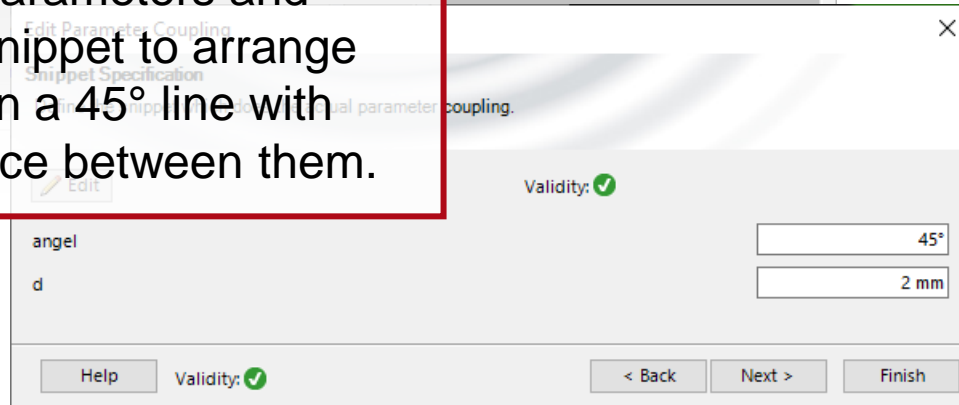
Edit Validity:

Help Validity: < Back Next > Finish

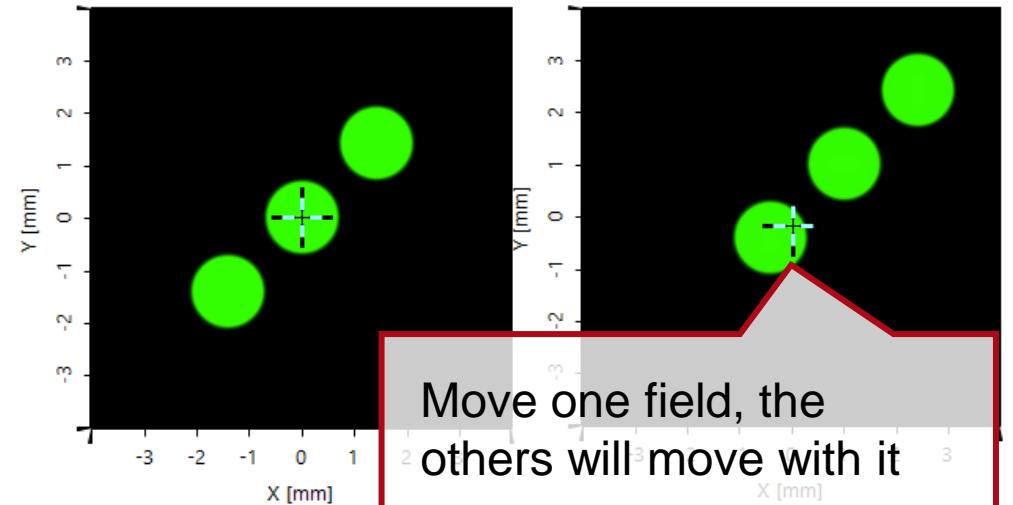
Use Parameter Coupling to Link Parameters – Positioning



Select the parameters and define the snippet to arrange the modes in a 45° line with 2mm distance between them.



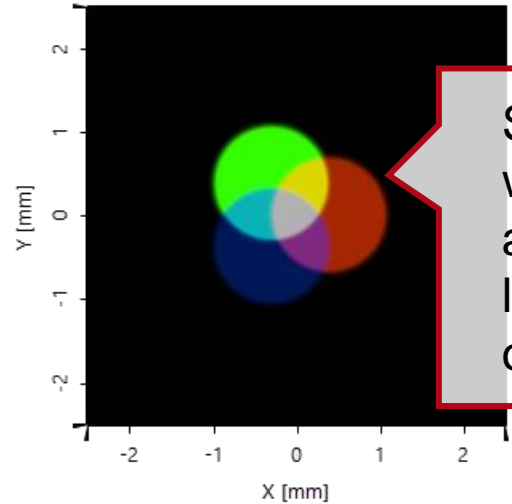
For example, use Parameter Coupling to fix the relative position of the fields, so that all fields will shift automatically with one movement.



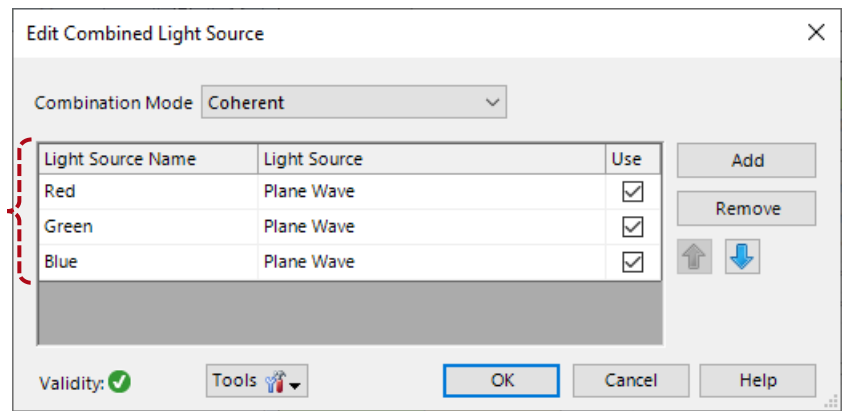
Simulation of the Additive (Light) Color Primaries

The visible light spectrum encompasses those wavelengths between 380nm and 750nm, which produce colors ranging from purple to red. However, red, green and blue are considered primary colors, since their combination can generate almost all other colors.

In this example, the three primary colors are simulated using the multiple light source, and their mixing behavior is investigated.

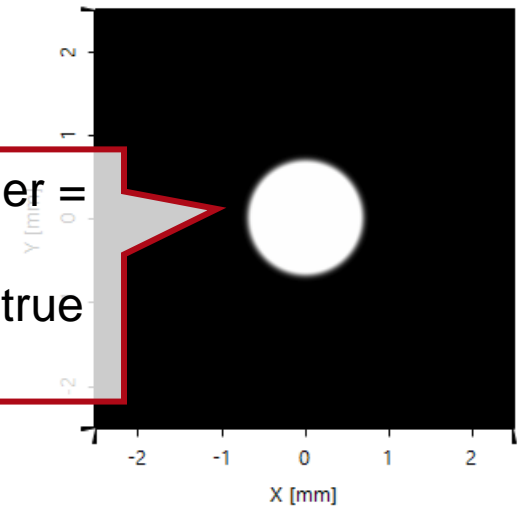


Set up multiple light sources with different wavelengths, and the additive mixing of light can be observed in the overlapping area.



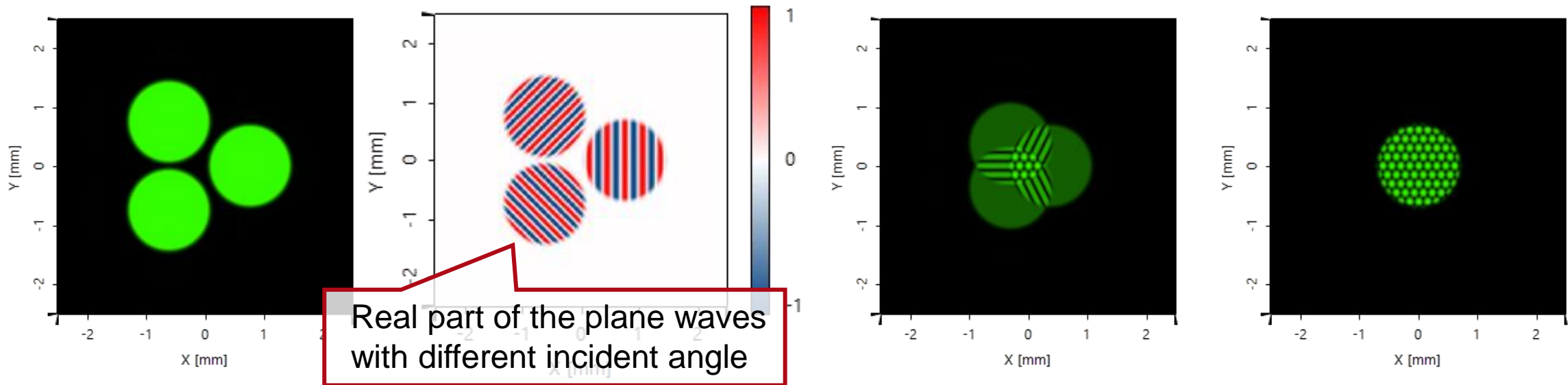
plane waves with different wavelength

All colors added together = white.
The absence of light = true black.



Simulation of Coherence Effects

Set up plane waves with different angles of incidence that therefore carry different linear phases.



By shifting the position of the plane waves, the interference pattern at the overlapping areas can be observed.

Document Information

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