

Scenario 278.01: Simulation of interferometer with temporal partially coherent light source

Demonstrate the modeling of a temporal partially coherent light source and the light propagation in an interferometer.

Keywords: temporal coherence, interferometer, spectral band width

Required Toolboxes: Starter Toolbox

Related Tutorials:



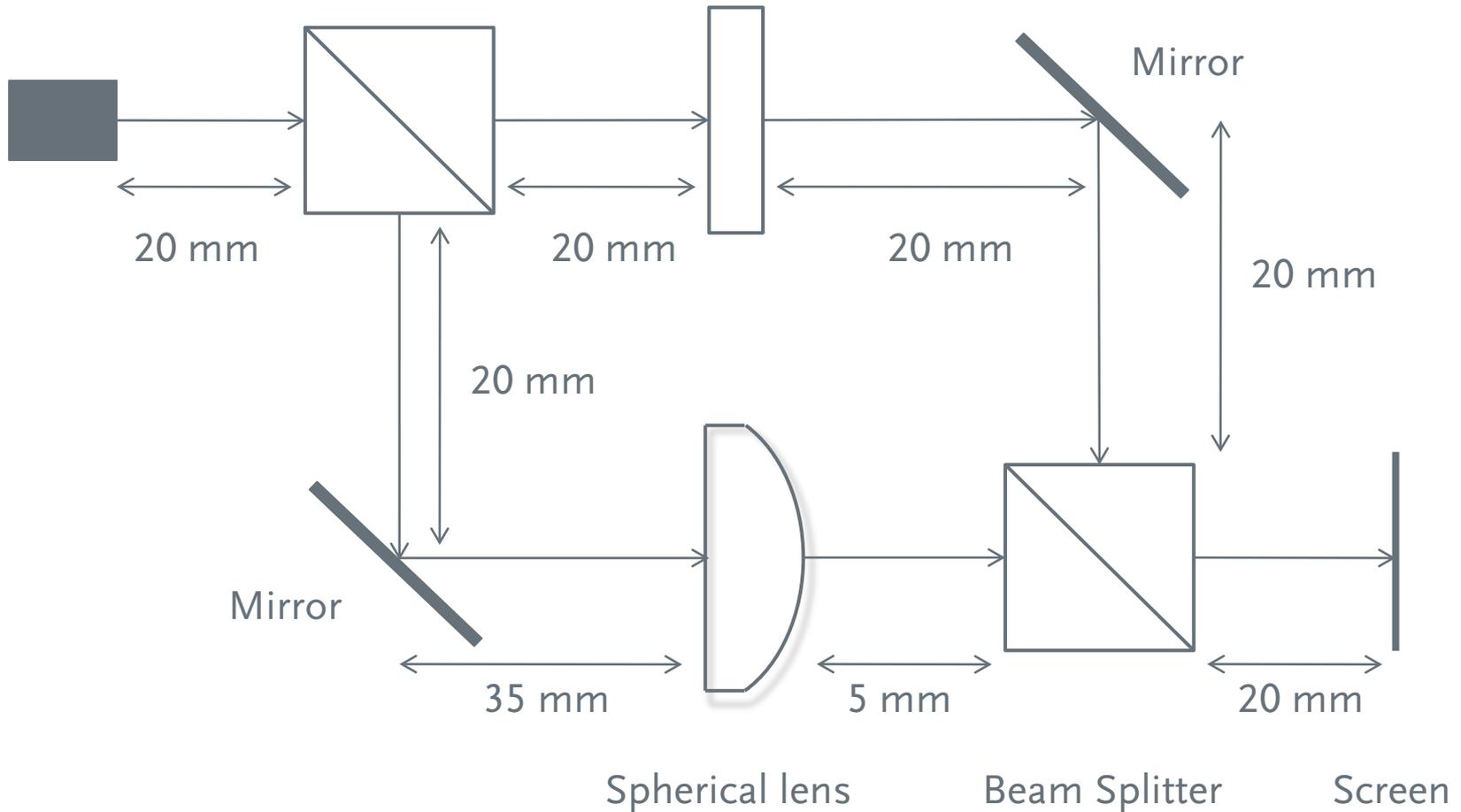
Modeling Task

Polychromatic source

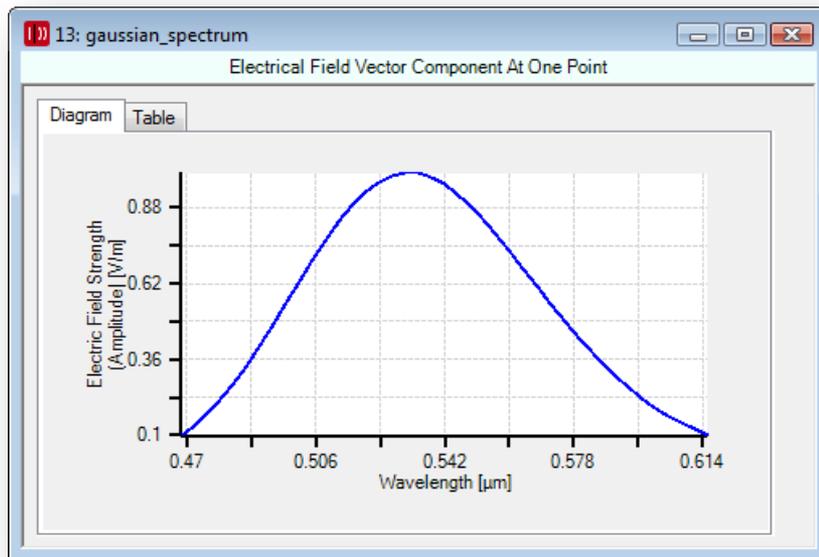
Beam Splitter

Phase Delay Plate

Mirror

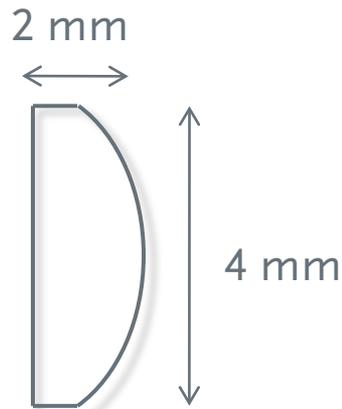
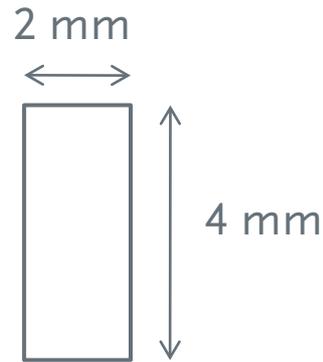


Modeling Task



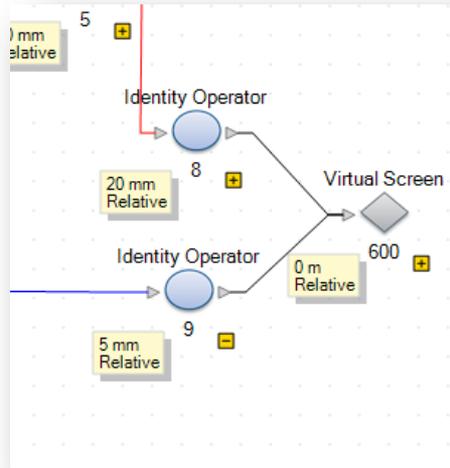
- The light source has constant intensity with 3.5 mm diameter.
- The center wavelength is 532 nm.
- Gaussian spectrum with 56 nm FWHM.
- Spectrum corresponds to a temporal coherence length of 5 μm .
- Spectral distribution can be generated with spectrum generators in light source menu.
- 41 wavelengths are used for simulation.

Modeling Task



- The interferometer measures a spherical lens with a radius of curvature of 100 mm.
- In the reference path a phase delay plate is used.
- Plate and lens are made of BK7.

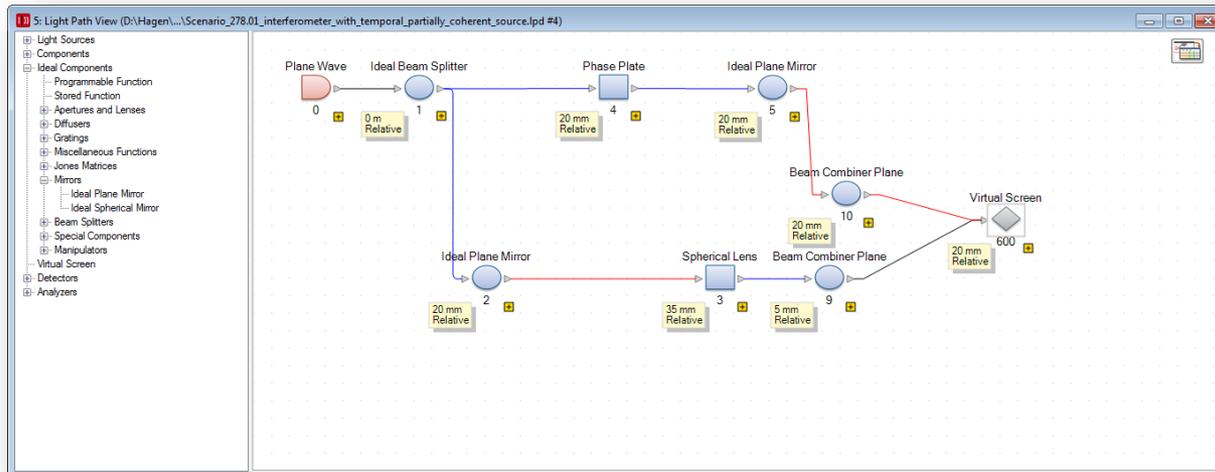
Modeling Task



<i>Medium</i>	<i>Sum</i>	<i>Propagation Method</i>
Standard Air in	Yes	Combined SPW/Fresnel Operato
Standard Air in	Yes	Combined SPW/Fresnel Operato

- Splitting of light beam by ideal beam splitter.
- Combining of laser beam by virtual screen. The screen must be switched in sum-mode to interfere the light distributions.

Light Path Diagram



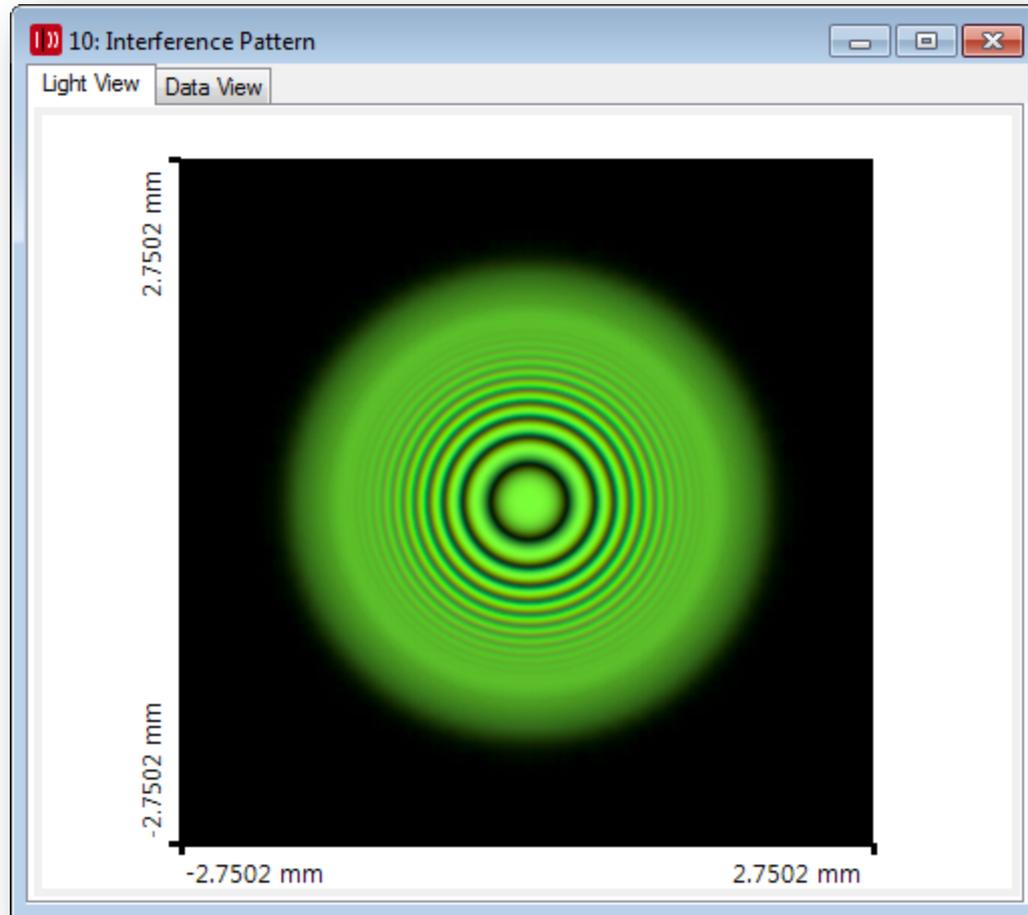
4: Light Path Editor (D:\Hagen\...\Scenario_278.01_interferometer_with_temporal_partially_coherent_source.lpd #4)

Path Detectors Analyzers

Start Element			Target Element		Linkage			Color
Index	Type	Channel	Index	Type	Propagation Method	On/Off		
✓ 0	Plane Wave	-	1	Ideal Beam Splitter	Combined SPW/Fresnel Operator	On	Black	
✓ 1	Ideal Beam Splitter	0	4	Phase Plate	Combined SPW/Fresnel Operator	On	Blue	
✓ 4	Phase Plate	T	5	Ideal Plane Mirror	Combined SPW/Fresnel Operator	On	Blue	
✓ 5	Ideal Plane Mirror	R	10	Beam Combiner Plane	Combined SPW/Fresnel Operator	On	Red	
✓ 1	Ideal Beam Splitter	1	2	Ideal Plane Mirror	Combined SPW/Fresnel Operator	On	Blue	
✓ 2	Ideal Plane Mirror	R	3	Spherical Lens	Combined SPW/Fresnel Operator	On	Red	
✓ 3	Spherical Lens	T	9	Beam Combiner Plane	Combined SPW/Fresnel Operator	On	Blue	
✓ 9	Beam Combiner Plane	0						

Tools Re-Use Automatic Settings Simulation Type: Field Tracing Go

Simulation Results



Summary

- VirtualLab™ can model temporal partially coherent sources.
- Modeling of interferometers possible.
- Interferences of partially coherent waves can be calculated.