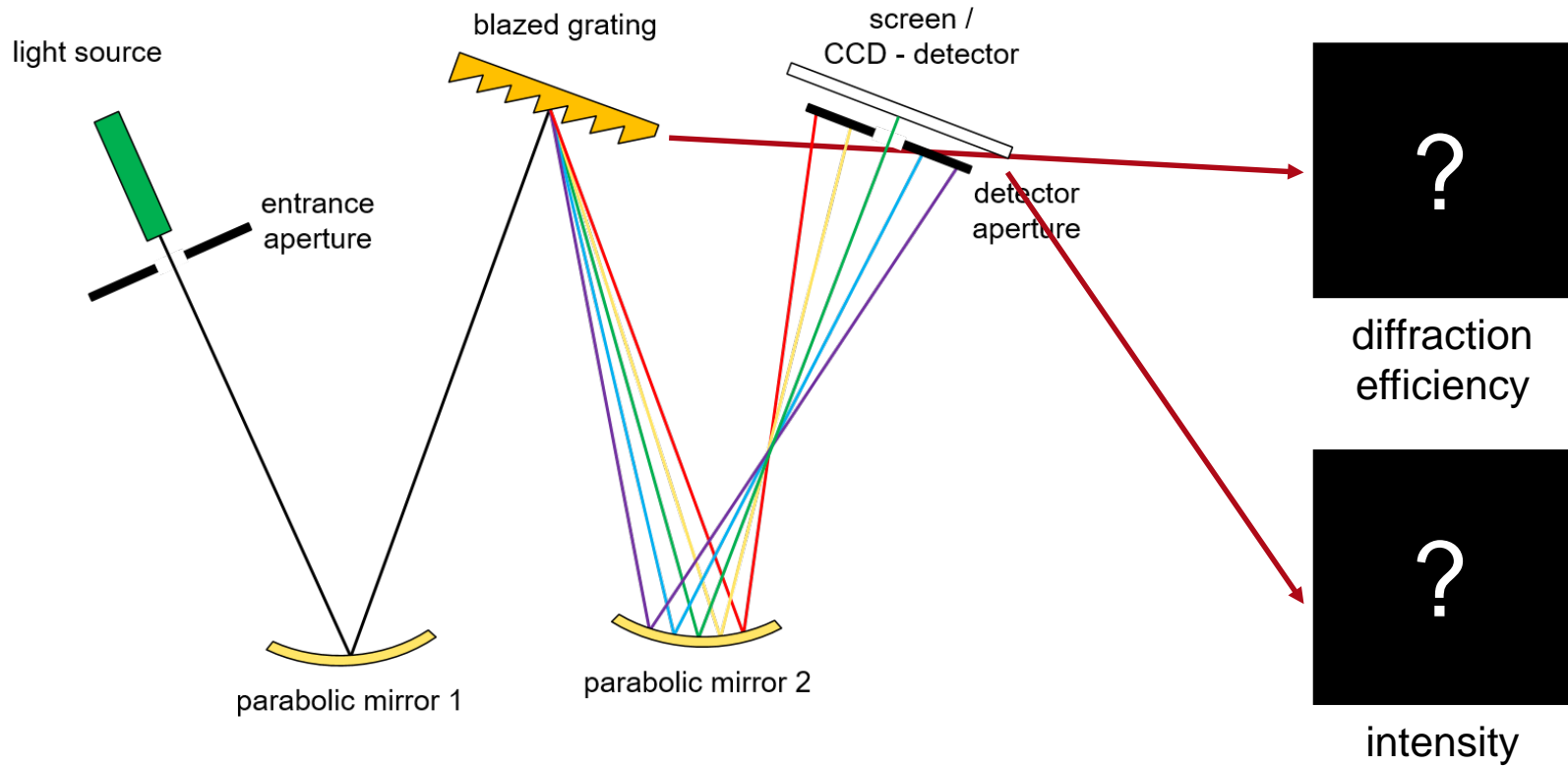


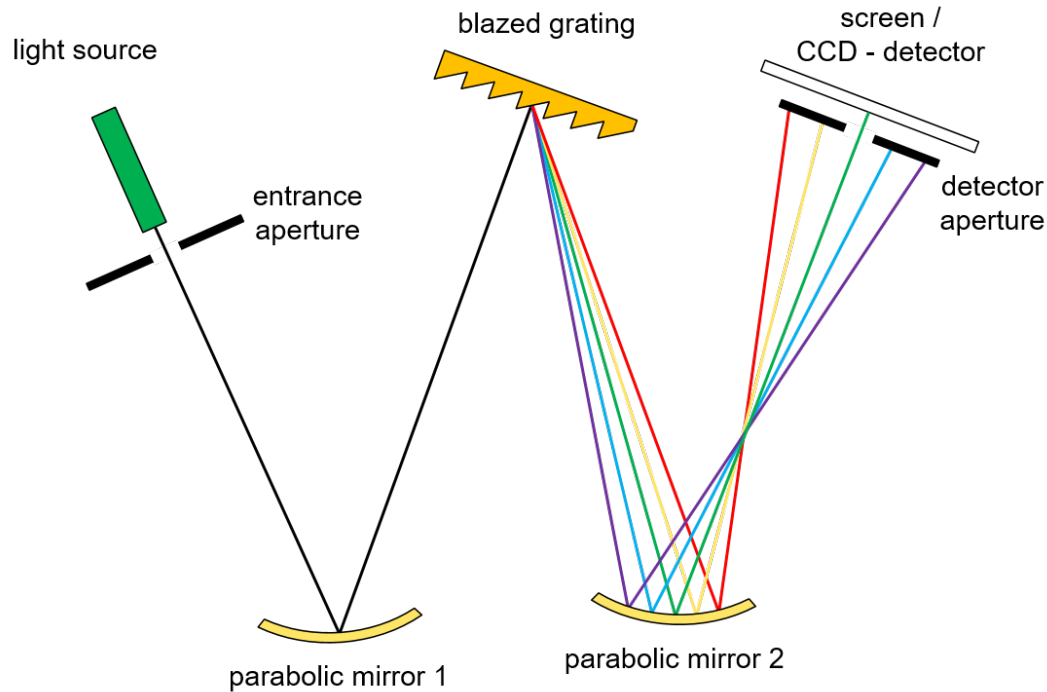
Optical Metrology > Monochromator

Czerny-Turner Monochromator – Analysis of Diffraction Efficiency

Task/System Illustration

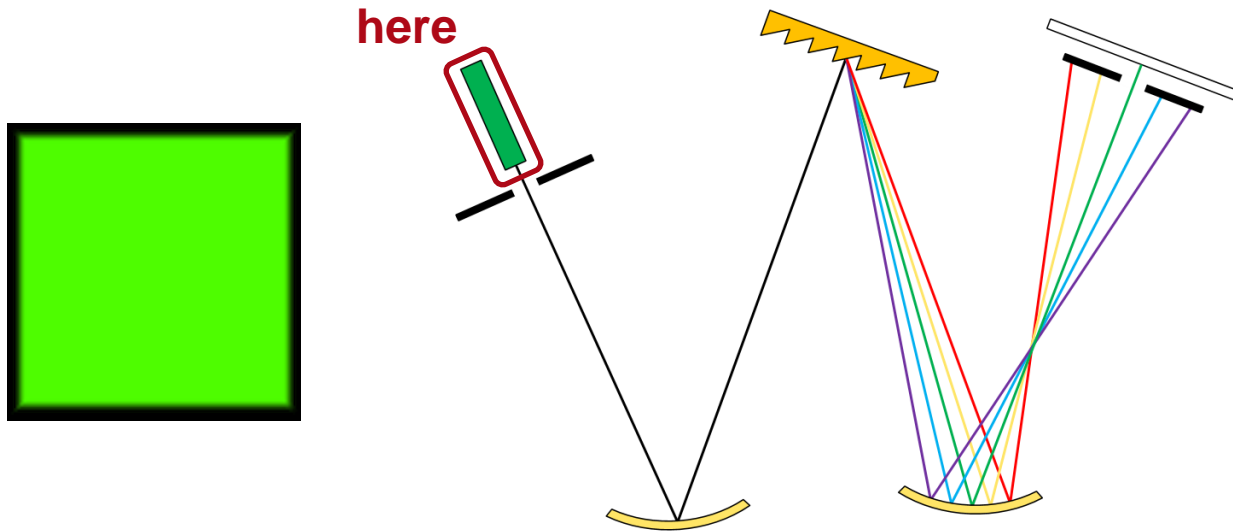


Highlights



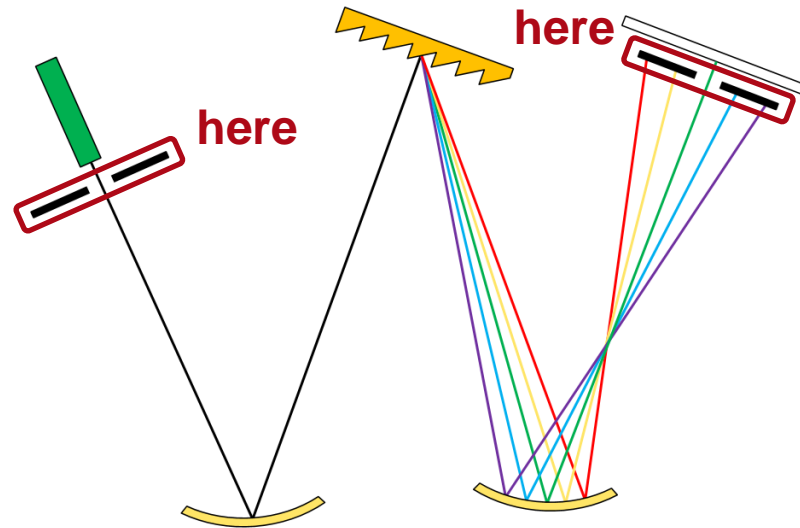
- high-performance analysis of complex optical systems
- full vectorial analysis of gratings by using rigorous algorithm (FMM)

Specification: Light Source



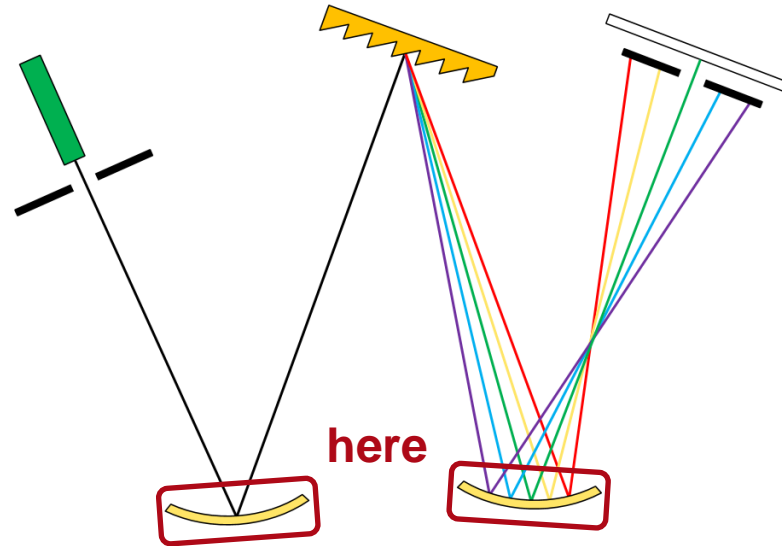
Parameter	Description / Value & Unit
type	plane wave
wavelengths	463nm, 496nm, 535nm
polarization	linear in x-direction (0°)

Specification: Apertures



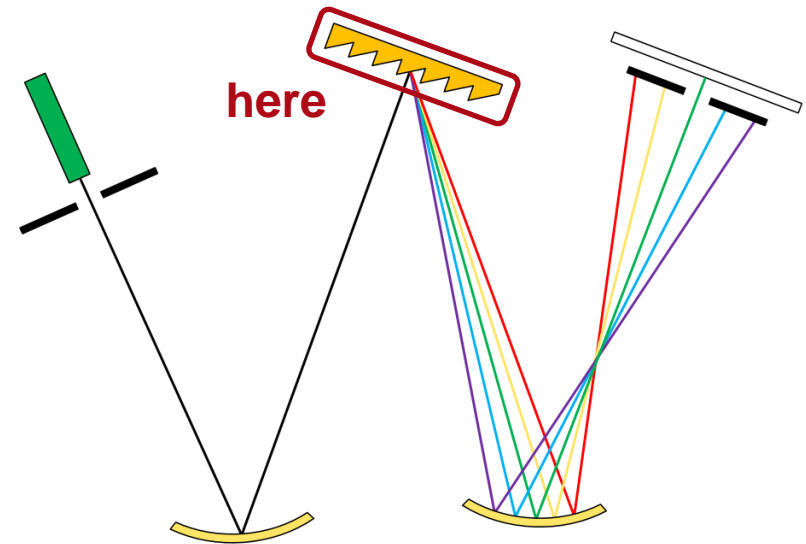
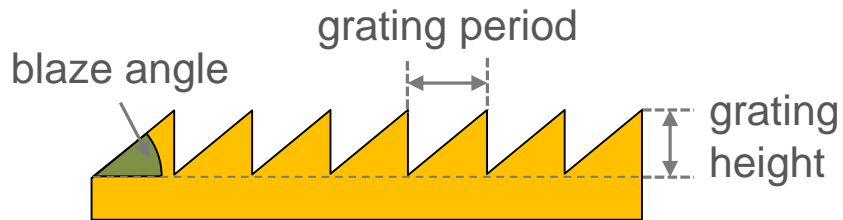
Parameter	Description / Value & Unit
width of entrance aperture	500 μm
width of detector aperture	649 μm

Specification: Parabolic Mirrors



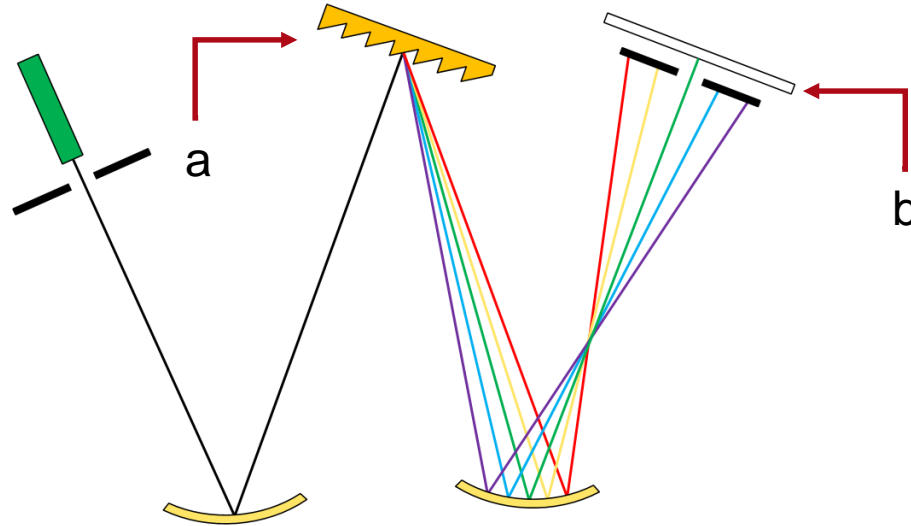
Parameter	Description / Value & Unit
type	parabolic mirror
material	ideal high-reflective material
focal length	100 mm
diameter	20 mm
tilt angle	5°
reflectance	100%

Specification: Grating



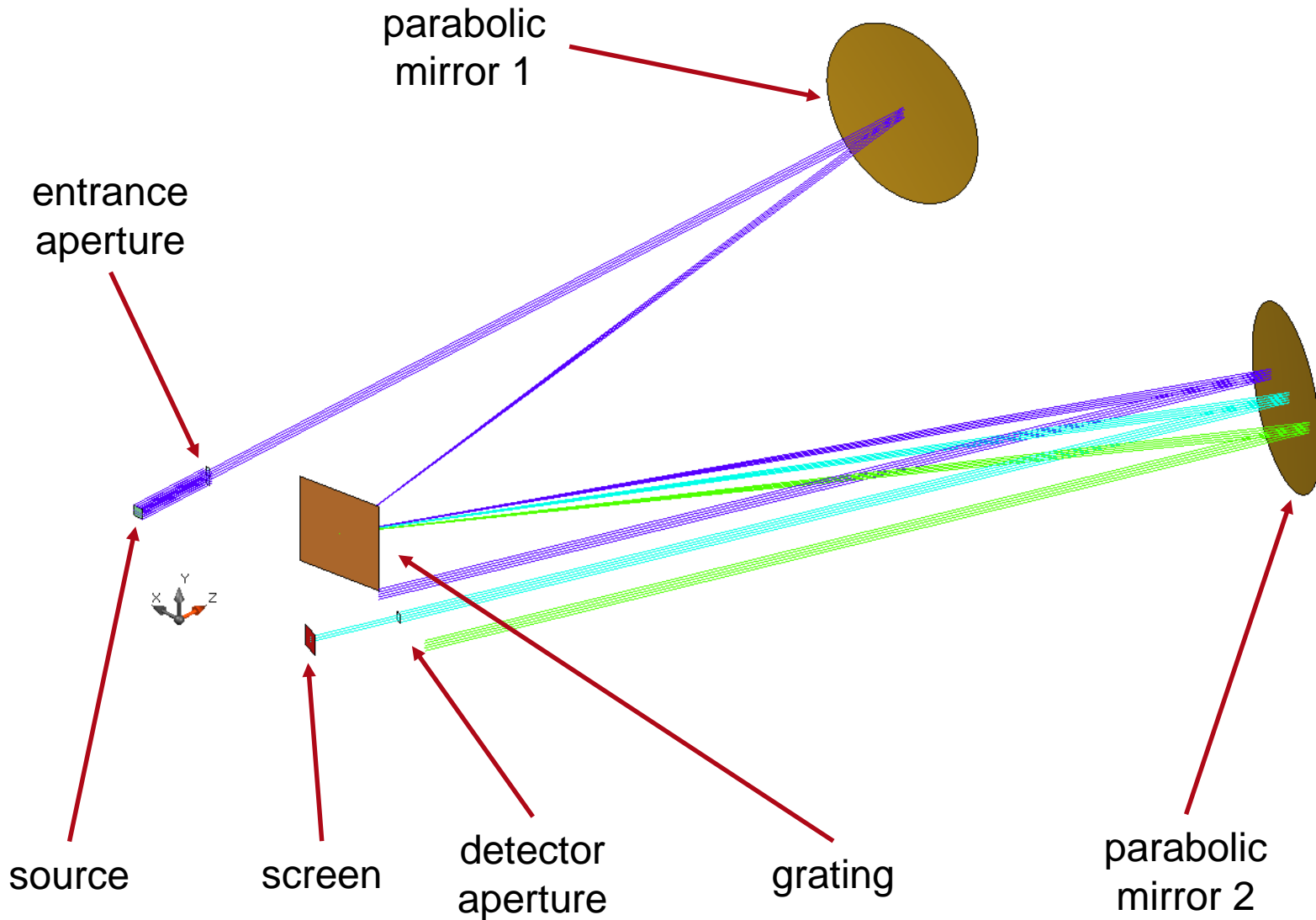
Parameter	Description / Value & Unit
grating period	833 nm
grating height	282.4 nm (optimized for -1 st order efficiency)
blaze angle	18.7°
grating material	silver (Ag)
substrate material	silver (Ag)

Specification: Detectors



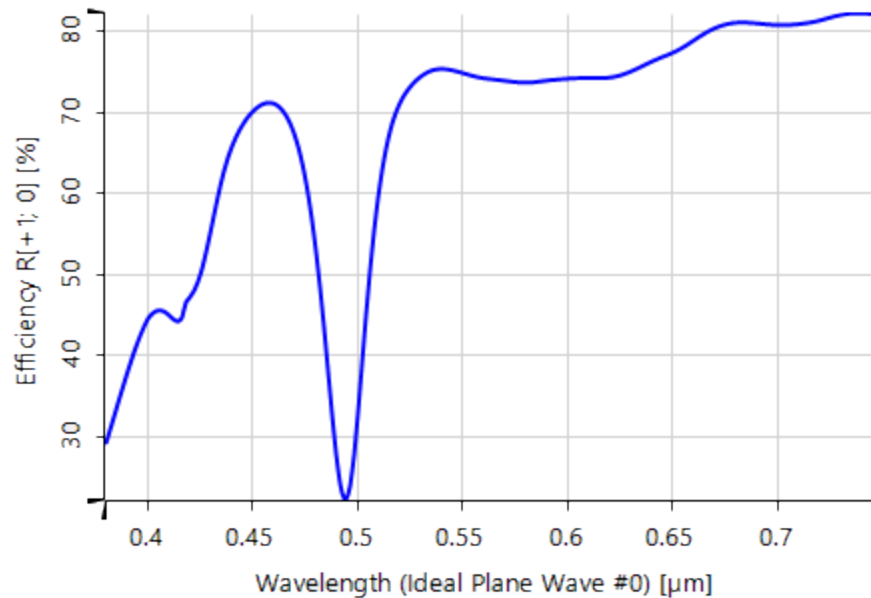
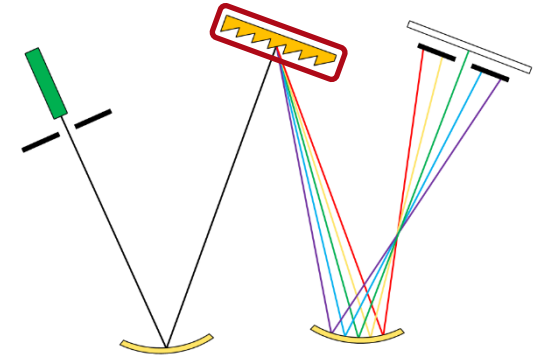
Position	Modeling Technique	Detector/Analyzer
full system	3D ray tracing	3D ray tracing system visualization
a	Fourier modal method	rigorous diffraction efficiency calculation
b	field tracing	2D intensity (real color view)

Result: 3D Ray Tracing

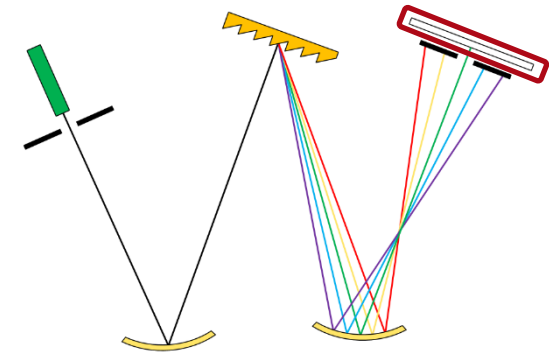
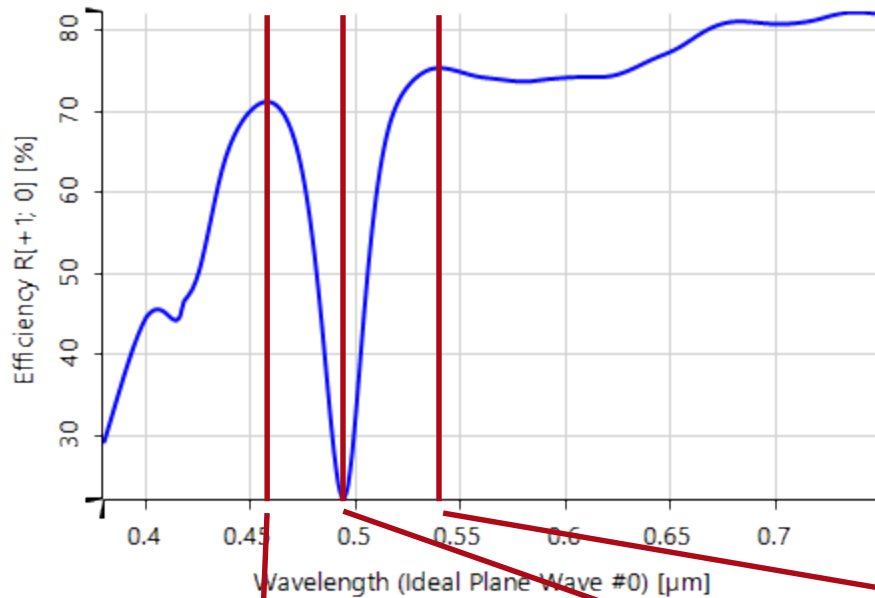


Result: Grating Diffraction Efficiency

grating efficiency for 1st diffraction order:

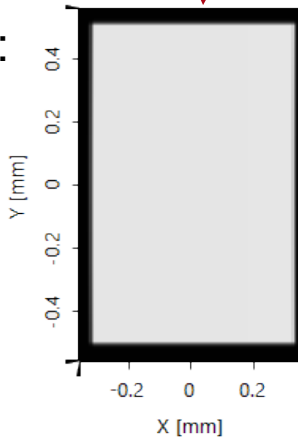


Result: Grating Diffraction Efficiency

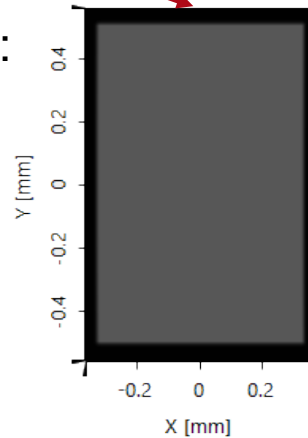


intensity variations caused by different diffraction efficiency

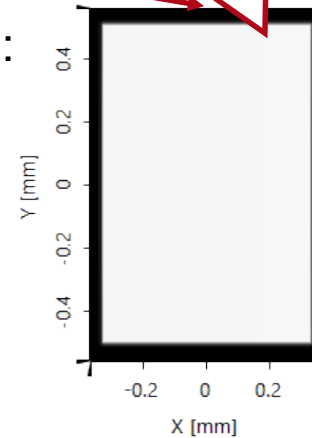
463nm:



496nm:



535nm:



Document & Technical Info

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title	Czerny-Turner Monochromator – Analysis of Diffraction Efficiency
category	Optical Metrology
created by	Rui Shi (LightTrans)
used VL version	7.0.0.29

Specifications of PC Used for Simulation

Processor	i7-4700MQ (1 CPU cores)
RAM	16 GB
Operating System	Windows 8