

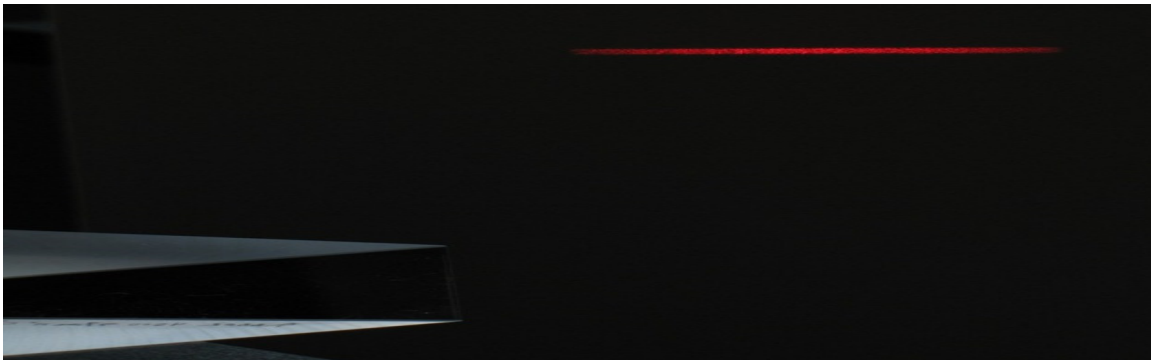


# N-Slit Laser Interferometer

Interferometric Optics introduces its N-Slit Laser Interferometer (NSLI) applicable to:

- Assessment of transmission gratings and optical surfaces
- Interferometric imaging
- Interferometric microdensitometry
- Interferometric microscopy
- N-slit interference
- N-slit interferometry
- Secure interferometric communications

Based on multiple-prism beam expansion and digital detection the N-slit interferometer allows for the rapid interferometric characterization of *transmission optical surfaces in general*. A significant advance over traditional point-by-point incoherent microdensitometers and point-by-point incoherent microscopes.



Extremely elongated Gaussian beam (with a 30  $\mu\text{m}$  height, at its center, and a 60 mm width) used as illumination source in the NSLI. The last stage in the multiple-prism beam expansion array is shown at the lower left. Note: the beam in this image appears much higher due to saturation in the detector array capturing the image.

Specific applications include:

Characterization of arrays of micro holes and/or micro nozzles  
Characterization of biomedical and organic molecular arrays  
Characterization of molecular, and digital, imaging surfaces  
Clear air turbulence  
Crystalline surfaces  
Forensic science  
Optical metrology of surfaces and transmission gratings  
Secure interferometric communications  
Textiles

### NSLI Specifications

Model	Wavelength	Beam dimensions <sup>†</sup>	S/N	Price <sup>††</sup>
NSLI-543-1	543 nm	30 × 25000 μm	~10 <sup>7</sup>	US 83 000
NSLI-543-2	543 nm	30 × 50000 μm	~10 <sup>7</sup>	US 93 000
NSLI-594-1	594 nm	30 × 25000 μm	~10 <sup>7</sup>	US 83 000
NSLI-594-2	594 nm	30 × 50000 μm	~10 <sup>7</sup>	US 93 000
NSLI-632-1	632 nm	30 × 25000 μm	~10 <sup>7</sup>	US 83 000
NSLI-632-2	632 nm	30 × 50000 μm	~10 <sup>7</sup>	US 93 000

<sup>†</sup> At focal plane. The wider dimension is along the plane of propagation.

<sup>††</sup> NSLI are manufactured with all US made optical components. Prices apply to laboratory size units. Larger NSLI, with intra interferometric lengths up to 30 m, and additional beam dimensions, available on request.

### Literature

- F. J. Duarte and D. J. Paine, Quantum mechanical description of N-slit interference phenomena, in *Proceedings of the International Conference on Lasers '88*, R. C. Sze and F. J. Duarte (Eds.) (STS, McLean, Va, 1989) pp. 42-47.
- F. J. Duarte, in *High Power Dye Lasers*, F. J. Duarte (Ed.) (Springer-Verlag, Berlin, 1991) Chapter 2.
- F. J. Duarte, On a generalized interference equation and interferometric measurements, *Opt. Commun.* **103**, 8-14 (1993).
- F. J. Duarte, Electro-optical interferometric microdensitometer system, *US Patent* 5255069 (1993).
- F. J. Duarte, Secure interferometric communications in free space, *Opt. Commun.* **205**, 313-319 (2002)
- F. J. Duarte, Secure interferometric communications in free space: enhanced sensitivity for propagation in the metre range, *J. Opt. A: Pure Appl. Opt.* **7**, 73-75 (2005).
- F. J. Duarte *et al.*, The N-slit interferometer: an extended configuration, *J. Opt.* **12**, 015705 (2010).
- F. J. Duarte *et al.*, N-slit interferometer for secure free-space optical communications: 527 m intra interferometric path length, *J. Opt.* **13**, 035710 (2011).
- F. J. Duarte *et al.*, Diffractive patterns superimposed over N-slit interferograms, *J. Mod. Opt.* **60**, 136-140 (2013).
- F. J. Duarte and T. S. Taylor, Quantum entanglement physics secures space-to-space interferometric communications, *Laser Focus World*, **51** (4), 54-58 (2015).
- F. J. Duarte, Tunable laser microscopy, in *Tunable Laser Applications*, 3rd Ed., F. J. Duarte (Ed.) (CRC, New York, 2016) Chapter 9.
- F. J. Duarte, Interferometric imaging, in *Tunable Laser Applications*, 3rd Ed., F. J. Duarte (Ed.) (CRC, New York, 2016) Chapter 10.
- F. J. Duarte, Secure space-to-space interferometric communications and its nexus to the physics of quantum entanglement, *Appl. Phys. Rev.* **3**, 041301 (2016).

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