

The Single Frequency DPSS UniKLasers

PRO-LITE TECHNOLOGY IBERIA

ABSTRACT:

This technical note reminds us what Interferometry is, its applications, how to build an interferometer, and why some of the laser specs are critical for that. Later on, the main specifications from the Single Frequency DPSS UniKLasers are described, and a short abstract about Pro-Lite Iberia.

RESUMEN:

Esta nota técnica nos recuerda qué es la Interferometría, sus aplicaciones, cómo se construye un interferómetro y por qué ciertas características del láser son críticas para ello. A continuación, se describen las principales ventajas de los láseres DPSS Single Frequency de UniKLasers, así como un breve resumen sobre Pro-Lite Iberia.

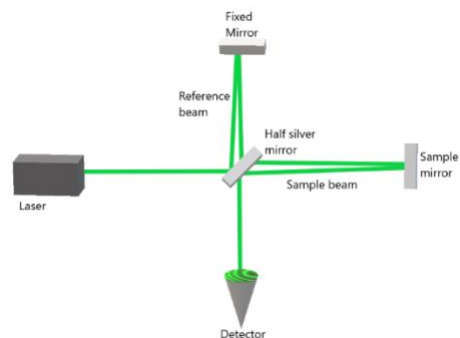
Definition

Interferometry is a range of techniques that rely on the superimposing of two coherent light source beams, usually split from a single laser, to form an interference pattern. Crucially changes in the differences between the two beam paths, will result in measurable changes to the constructive and destructive interference pattern.



The technique can be used for many different applications, from simple distance measurements with an accuracy in the order of the wavelength used, to structural and stress studies to measurement of the gravitation waves.

The setup is, in theory, very simple. The laser beam is split in two by a half-silvered mirror, to create two arms. One is a reference arm with a fixed path, the other forms the moving sample beam. Since the two beams form from the same coherent laser, the outward beams are in phase, therefore if the path lengths are the same, they will still be in phase on reaching the detector. Slight deviations in path distance of the sample beam will change its relative phase compared to the reference beam and therefore the interference pattern.



It is this changing interference pattern that is the measurable output

Laser Considerations

In order to build a proper interferometer, the following laser parameters are critical:

- Narrow Line width giving long coherence lengths
- High wavelength stability with no mode hop or drift
- High power with high stability for long term monitoring
- Pointing stability
- Wavelength choice

Interferometry is demanding on the specifications of the coherent light source used. Firstly, the coherence length needs to be long and stable to ensure that pattern changes are due to the sample rather than the laser.

Since a sample movement equivalent to the wavelength will result in the paths being back in phase, measurement limits are defined by the wavelength of the source. Longer wavelengths give a wider range of measurement, while shorter wavelengths give a higher resolution. A selection of available wavelengths is therefore important.

The beam should have a good shape and pointing stability should be high. High beam pointing stability ensures the same part of the sample is being measured and the beam profile increases the simplicity of the results.

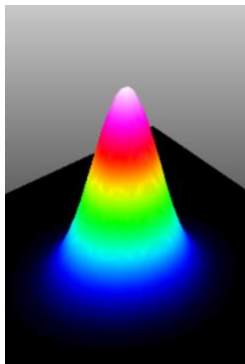
And finally, the power level available can be an important consideration since the availability of high power lasers enables the imaging of larger areas.

UniLasers Product offering

UniLasers offers DPSS Single Frequency lasers based on their patented BRaMMS (Bragg Range Michelson Mode Selection) technology, utilizing the spectrum discriminatory feature of a Michelson interferometer setup within a spectral range preselected by Volume Bragg Grating (VBG). This suppresses all but one lasing longitudinal mode within a laser cavity.

Due to significantly lower power consumption for any required output and the resulting simplified thermal management, the BRaMMS laser technology provides up to 10 times wider range of output power scalability from the smallest footprint. It opens up applications within portable and remotely controlled systems and devices, which were never before considered feasible.

This proprietary patented technology provides reliable, cost effective, compact all-solid-state and class leading solutions for both well-established and currently unavailable wavelengths in the NIR, visible as well as in the emerging UV-spectrum range, whilst maintaining environmentally sound methodologies



Features:

- All lasers are single frequency
- Line widths below 500kHz
- Wavelength Drift < 1.1pm
- Guaranteed to be mode-hop free
- High power stability
- M2 <1.1
- Pointing stability <5 μ rad/°C

UniLasers DPSS single frequency lasers specifications table:

Lasers	UV	Vis	NIR
Wavelengths (nm)	266*, 320* 349* 355* 360*	442, 515 523, 532 607, 640 698	720, 780** 813**, 1064 1125*
Linewidth (MHz)	<0.5		
Coherence length (m)	>100		
Spectral position stability (±pm)	0.65	1.1	2.5
Beam Quality	$M^2 < 1.05$		
Beam Pointing stability (μrad/°C)	< 5		
Power stability (% ±5°C over 4 hours)	<2		
Mode hop free tuning range (GHz)	40-50	30-40	25-30
Noise %rms 10Hz -0 10 MHz	0.1		

* Project work expected to be released in 2018

** Due for release in 2018

The company Pro-Lite Technology Iberia

Pro-Lite Technology Iberia is the Iberian office of the Pro-Lite Group, and is a distribution company focused on Photonics, Light Measurement, Remote sensing and Spectroscopy applications. Pro-Lite is specialized in distributing, installing and servicing Photonic instrumentation, and also provides technical training and technical advice in its field of expertise. With two calibration laboratories in UK and Germany ISO 9001 qualified, we can cover most of your Photonic needs.