

Principle of Interferometric Spectrometer



Article Overview

An interferometric spectrometer works by splitting light into two paths, creating interference patterns that are analyzed to determine the spectral composition of the light.

Basic Working Principle

An interferometric spectrometer, such as a Fourier Transform Infrared (FTIR) spectrometer, relies on the principle of interference of light waves. A collimated beam of polychromatic light is split into two separate optical paths using a Michelson interferometer. One path reflects off a stationary mirror, while the other reflects off a moving mirror. When the two beams recombine, they interfere constructively or destructively depending on the relative optical path difference, producing an interferogram that encodes the spectral information of the light source (JASCO) .

Interference and Signal Detection

For a monochromatic light source, the intensity of the recombined light varies sinusoidally as the moving mirror changes position. Constructive interference occurs when the waves are in phase, and destructive interference occurs when they are out of phase. For polychromatic light, the resulting interferogram is a complex superposition of sinusoidal signals corresponding to all wavelengths present in the source (JASCO) .

Conversion to Spectrum...

Article Content

Interferometry | Springer Nature Link

In interferometric systems using long coherence sources, use of appropriate quarter- and half-wave plates and

Interferometer

The interferometric configuration discussed above is known as Young's experiment. The same physical and mathematical

The Principles of Interferometric Spectroscopy: Optica Acta ...

(1979). The Principles of Interferometric Spectroscopy. Optica Acta: International Journal of Optics: Vol. 26, No. 12,

Michelson Interferometer & Fourier Transform Spectrometry

Fourier transform spectrometer uses the same basic configuration of mirrors and beamsplitter as a Michelson interferometer, but one

Michelson Interferometer and Fourier Transform Spectroscop

MICHELSON INTERFEROMETER AS FOURIER TRANSFORM SPECTROMETER Keywords: Maxwell's equations, wave equation,

Method of interference spectroscopy and operation principle

Superposition principle II kinds of interferometers make use of the same principle. A laser beam with high coherence length is split

Interferometers – types, operation principle,

This article explains the working principle of optical interferometers, where a light beam is split into two or

Interferometry | Springer Nature Link

Interferometry is the technical application of interference. Since the wavelength of light is in the range of several hundred

4.27: The Michelson Interferometer and Fourier Transform Spectroscopy ...

A Michelson interferometer with a movable mirror in one arm is an essential element in Fourier Transform (FT)

Principles of Interferometric Spectroscopy

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Optical interferometers and their application for studying fluid flow ...

Non-interferometric techniques such as shadowgraph or schlieren rely on detection of path of light rays as they traverse through the

Michelson Interferometers – operation principle, arm length difference ...

What are common applications of Michelson interferometers? Applications include precise distance measurements, optical

How Do Spectrometers Work? Spectrometer vs. Spectrophotometer

If the spectrometer has a large spectral range, it may also have filters to stop higher order light from reaching the sensor. Most

Basics of Interferometry

View chapter Publisher Summary This chapter discusses interference spectroscopy, where it explores the use of interferometric

Interferometric scattering microscopy

Interferometric scattering microscopy (iSCAT) is a label-free imaging technique that enables detection of nanoscale

What is an Interferometer? | LIGO Lab | Caltech

The principles of interference are easy to understand: Two or more waves interact. Add the heights and depths of the separate

Interferometry technology and measuring principles

The working principle of Interferometry technology consists on a splitting of the light into two beams that

Dual-comb spectroscopy

Dual-comb spectroscopy utilizes two optical frequency combs for precise, rapid measurements, enhancing

Wavemeters – wavelength meters, interferometer, Fourier transform ...

Both types acquire the spectrum via Fourier transform, using a scanning Michelson interferometer. This approach enables not only a

Interferometry

Interferometers are devices that extract information from interference. They are widely used in science and industry for the

4. Interferometric Spectrometers

All spectrometers work by superposing a number of rays of varying phase, the number being 10⁵-10³ for a grating, a few tens for a

Principles of Interferometry

In this review, I outline the principles of interferometry and describe how these are put into practice in a range of modern

Interferometry explained

Laser interferometry is a well-established method for measuring distances with great accuracy. In order to generate an interference

How do interferometric systems work?

Read our article to find out about the key working principles of how interferometric systems work and how this has influenced the

An Introduction to Interferometers for Highly Accurate

Parameters affecting the uncertainty of an interferometric measurement are likely to include

Spectral interferometry

Spectral interferometry (SI) or frequency-domain interferometry is a linear technique used to measure optical pulses, with the

Understanding an IR Spectrometer: A Complete Guide

An FTIR spectrometer uses a Michelson interferometer to separate a collimated beam of polychromatic

Interferometry

The principle of interferometry consists of determining the direction of the source of radiation using a combination of phase

INTERFEROMETRY: CONCEPTS AND APPLICATIONS

A short history of interferometry 5. 1881 8 Michelson experiment (speed of light) and his further works on interferometry, stellar

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For more information, pricing, or custom solutions, please contact us:

Website: <https://www.thebucketlistbook.co.za>

Email: sales@thebucketlistbook.co.za

Phone: +33 1 42 78 39 16

Address: 10 Rue de la Paix, 75002 Paris, France

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