Wavelength Meter

Sensitive and compact wavemeter with a large spectral range for high speed measurements of pulsed and continuous lasers.
The HighFinesse/Ångstrom wavelength meters are the unsurpassed high-end instruments for wavelength measurement of pulsed or continuous laser sources. They deliver the superb absolute and relative accuracy required by cutting-edge scientific research, as well as industrial and medical applications.

The unmatched precision of the WS8 series and all of our other wavemeters is achieved by using non-moving, temperature controlled Fizeau-interferometers in a unique geometric configuration.

The wavelength meters are connected to the PC via a USB interface and are ready for use as soon as the software delivered with the device is installed. A compact, thermally insulated housing holds the optical elements as well as the electronics. The design enables the integration of additional options, allowing customized solutions to specific applications even years after purchase.

Enter a new world of accuracy!

Unrivaled precision

The sturdiness of our design has been proven even under extreme conditions such as freefall dropping experiments or in air-borne applications (LIDAR). The absence of movable parts ensures our most valued advantages, e.g. high-speed measurements of pulsed and continuous lasers.

— Picture courtesy: DLR Institute of Atmospheric Physics

The optical unit consists of Fizeau-based interferometers which are read out by photodiode arrays. We achieve remarkable high accuracy and stability by using exclusive, non-moving optics.

The light is coupled into the device via a fiber and then collimated by a mirror, before entering the solid-state Fizeau-interferometers. The interference pattern is imaged by a cylindrical lens onto CCD photodiode arrays. This recorded pattern is transferred to your computer via a high-speed USB connection which allows data acquisition rates of up to 50 kHz.

The software fits and compares the pattern to a previously recorded calibration to calculate the wavelength. One significant advantage of our Fizeau-based wavelength meters, compared with other available instruments, is the absence of mechanical moving parts. This ensures the high reliability of accuracies up to 2 MHz (absolute) and ensures the outstanding robustness. HighFinesse wavelength meters are noted for. The design enables the precise measurement of not only continuous lasers, but also pulsed laser sources, which broadens the application range even further.

Another key benefit is the simplicity of our wavelength meters. Simply connect the USB cable and run the program supplied. That’s all it takes!
Up until now our multichannel switches have always been limited in either the wavelength range for single mode switches, or accuracy for multimode switches. Our new PCF switches solve this problem. Using endlessly single mode photon-crystal-fibers (PCF) allows us to produce a switch that offers single mode operation for all wavelengths. Using the PCF switch it is possible to switch between light-sources at any wavelength within the device’s measurement range and maintain the full accuracy. Combining the PCF switch with other options such as PID control opens new possibilities.

Sold exclusively with the WS8 the PCF switches are available in two-channel (standard), four-channel, and eight-channel configurations.

The HighFinesse/Ångstrom WS8 and PCF switch: enter a new world of accuracy!
Upgrade Options

Upgrade options expand the capabilities of our wavelength meters to match individual requirements of cutting edge research and measurements.

In order to measure the frequencies of more than just one laser at a time, an opto-mechanical switch is used. The combination of our highspeed wavelength meters with one of the quickest fiber switches (MEMS) available allows up to eight channels to be measured simultaneously. Exposure time and other parameters can be defined independently for each light source. You can choose between singlemode or multimode fiber switches, depending on the required accuracy level of your measurements.

With the PID option it is possible to stabilize the frequency of a laser connected to the wavemeter using a software based proportional-integral-derivative controller (PID controller). Unlike analog PID stabilizations, the PID option provides software based signal processing, allowing the laser to be stabilized to a specific user defined frequency. This makes it extremely useful in experiments where the laser frequency has to be actively regulated or varied to fit changing experimental conditions, such as laser cooling, atomic detection, trapping and spectroscopy. Combined with the MC option the wavemeter can be used to stabilize multiple lasers simultaneously. The regulation speed and quality and absolute accuracy match the measurement speed, relative accuracy and absolute accuracy of the wavemeter respectively. The measurement speed is not affected by the regulation.

The diffraction grating option allows the analysis of emission spectrum to an accuracy of 6 GHz for laser sources with broad emission. The software automatically searches the spectral section where the laser emission line is located and displays it on the screen. In combination with the additional Fizeau interferometer array this allows wide range applications with a single device.

The algorithm enables the estimation of the linewidth several times better than the spectral resolution of the instrument.

The linearity estimation of a singlemode laser source is performed by a special algorithm which eliminates the interferometer’s instrument response function.

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HighFinesse/Ångstrom offers a number of highly specialized wavelength meters. Ultra-fast measurements, standalone devices, or customer specific modifications: we are always open to make your requirements possible!

**Fastest Wavemeters**

Our WS Fast series features ultra high speed measurement rates, the fastest commercially available!

Read out rates can be up to 24 kHz in the 330 – 1180 nm and even up to 76 kHz in the 980 – 1650 nm wavelength range. Fast swept laser sources can be precisely characterized with these wavemeters.

**HighFinesse/Ångstrom Wavelength Meters**

- Multi-color availability
- Multichannel Switch (Option)
- PID Laser Control (Option)
- Calibration
- Power supply

**Features**

- Wavelength Measurement
- Longterm Graph
- Relative Power Measurement
- Network: SCPI via Ethernet
- Linewidth Estimation (Option)
- External Trigger (Option)
- PID Laser Control (Option)
- Multichannel Switch (Option)

**Specifications**

- Measurement range
- Absolute accuracy
- Quick coupling accuracy
- Wavelength deviation sensitivity
- Line calculation speed
- Measurement rate
- Minimum exposure time
- Maximum exposure time
- Minimum required input energy and power
- Fizeau interferometers (Fine/Wide Mode)
- Calibration
- Recommended calibration period
- Warm-up time
- Dimensions
- Weight
- Interface
- Power supply

**OEM and customizations**

While our standard housings are well suited for lab conditions there are cases where our devices are subjected to extreme conditions. For these instances we can work with the customer to design a housing suitable for their requirements. In the past these have included an increased protection from environmental influences and increased shock resistance. Contact us for user defined functions or OEM applications!

**Right:** The unmatched accuracy of our wavemeters is used to actively stabilize the seed laser of a Laser Guide Star system. This guarantees that the yellow laser light is exactly on resonance with the atomic transition to enable the LGS to shine bright!

**Left:** Y. Beletsky courtesy ESO
HighFinesse/Ångstrom optical spectrometers LSA and HDSA are designed to analyze the multi-line or broadband spectrum of light sources like cw and pulsed lasers, gas discharge lamps, super luminescence diodes, semiconductor laser diodes and LEDs. They are suitable to analyze the spectrum of telecom signals, resolve Fabry-Perot modes of a gain chip, and produce a spectral measurement of gas absorption.

HighFinesse GmbH
Auf der Morgenstelle 14 D
72076 Tübingen/Germany

T + 49 (0) 7071-96 85 15
F + 49 (0) 70 71-96 85 17
M info@highfinesse.com

HighFinesse Linewidth Analyzers (LWA) are specialized high-end devices for measuring and analyzing the spectral shape of various laser sources. Through the use of two measurement modes, the LWA can analyze both very narrow laser lines down to 100kHz as well as broader spectra up to 1GHz. They feature an extremely high resolution and accuracy in determining the linewidth of the respective laser source and its spectral lineshape. The LWAs are ideal for optimizing the stability of laser setups.