7/2017

Piezo Wavelength Control Dye Laser

General

The Piezo Wavelength Control (PWC) option for Sirah's pulsed dye laser resonators allows to alternate the laser wavelength for successive laser pulses. This option uses a piezoelectric transducer which is mounted to the resonator's tuning element. The latter can either be a mirror or a grating. The transducer acts on a special lever mechanism to amplify the piezo movement such that substantial wavelength detuning is achieved. The exact detuning depends on the resonator configuration and on the wavelength region.

The PWC has a mechanical end stop for the zero voltage position of the piezoelectric transducer. The tuning element is pushed by a spring load into the end-stop. So, the tuning accuracy for this position is the same as for the laser without PWC.
The PWC option is completely integrated into the laser system's housing, including the necessary high voltage supplies and control electronics.
Trigger signals can either be generated by the PWC itself, or the PWC can be controlled by external trigger signals.

Frequency Conversion

Many applications of the Piezo Wavelength Control require non-linear conversion of the dye laser's fundamental frequency into the ultraviolet or infrared spectrum. For these applications two crystals are put in series into the frequency conversion unit. Alternating pulse-by-pulse one crystal serves as a compensator for the other.

The FCU-WOCC upgrades the compensator axis of a standard frequency conversion unit with a fine pitch screw for precision angle tuning.
For the conversion in to the ultraviolet closed-loop feedback by auto-tracking is supported.

Characteristics

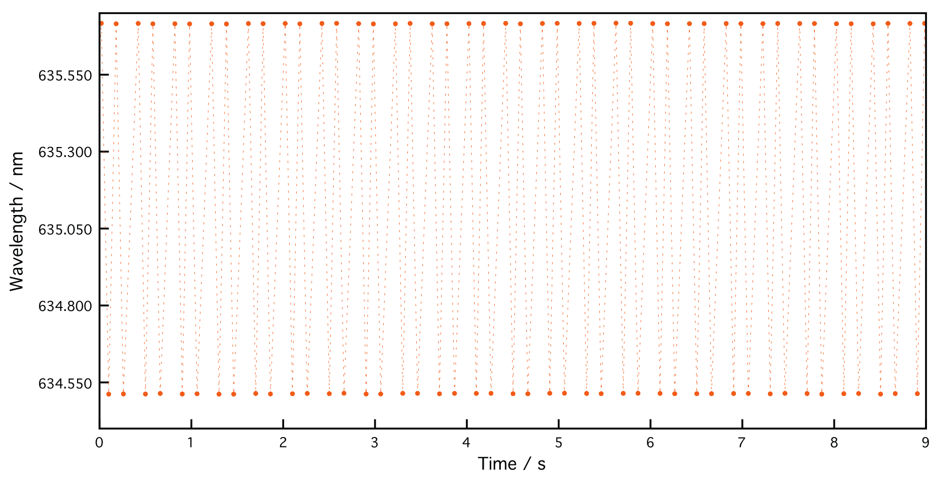
Maximum Wavelength Difference [1]	2..6 nm [2]	(prism models: 20 nm)
Absolute Tuning Accuracy [1] [3]	< 10 pm	(prism models: 100 pm)
Absolute Long Term Drift [1] [4]	< 4 pm / h	(prism models: 150 pm / h)
Maximum Repetition Rate	30 Hz	

[1] for detuned position of the oscillator, for zero voltage position refer to laser's datasheet

[2] depending on grating configuration

[3] shot-to-shot, root mean square

[4] at constant ambient conditions



Operation at 10 Hz, recorded with a wavemeter. Each circle denotes a single laser shot

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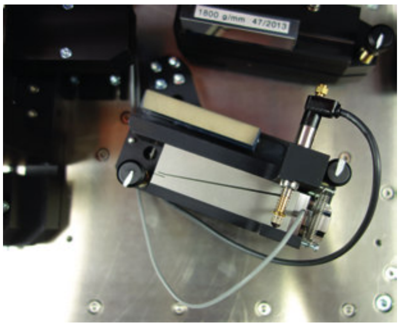
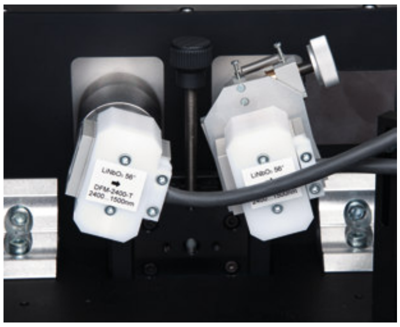
Piezo Wavelength Control





Feedback Control

For improved long-term stability and shot-to-shot accuracy a feedback option is available. This option uses a sensor that measures the position of the piezoelectric transducer. The result is fed back into the control electronics. The entire set-up is fully integrated into the laser system.

Feedback Characteristics

Maximum Wavelength Difference [1]	2..6 nm [2]
Absolute Tuning Accuracy [1) 3]	< 5 pm
Long Term Drift [1) 4]	< 2 pm / h
Maximum Repetition Rate	10 Hz

[1] for detuned position of the oscillator, for zero voltage position refer to laser's datasheet

[2] depending on grating configuration

[3] shot-to-shot, root mean square

[4] at constant ambient conditions

Specifications are subject to change without notice

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