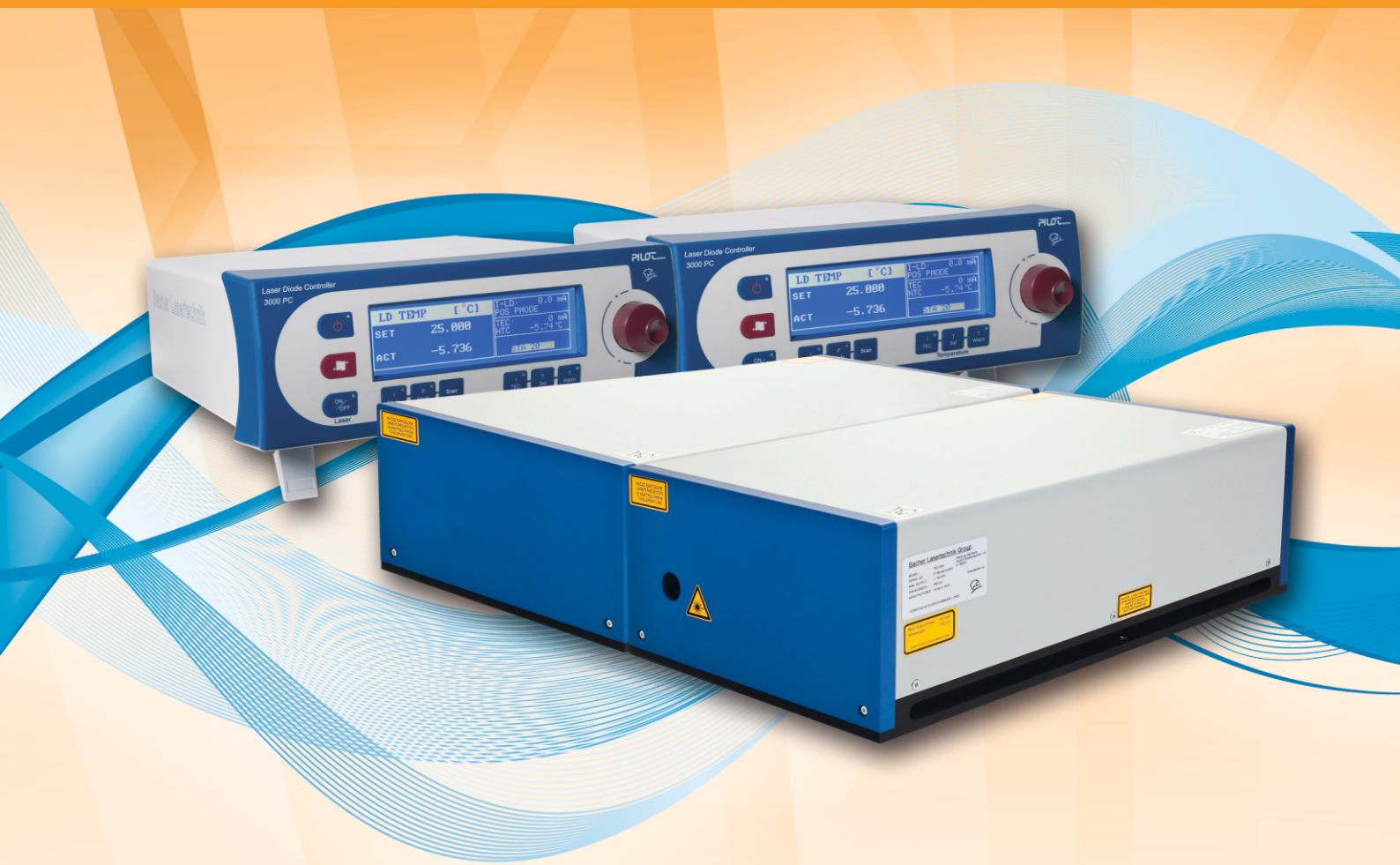
Sacher Lasertechnik Group

Second Harmonic Generation

Visible Tunable Laser System
Hänsch Couillard Locking
Fast Relocking Scheme

Scientific Lasers

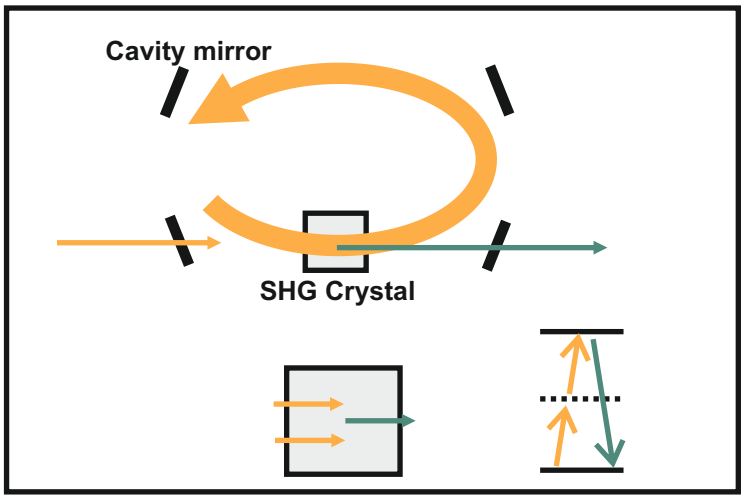


TEC 1000

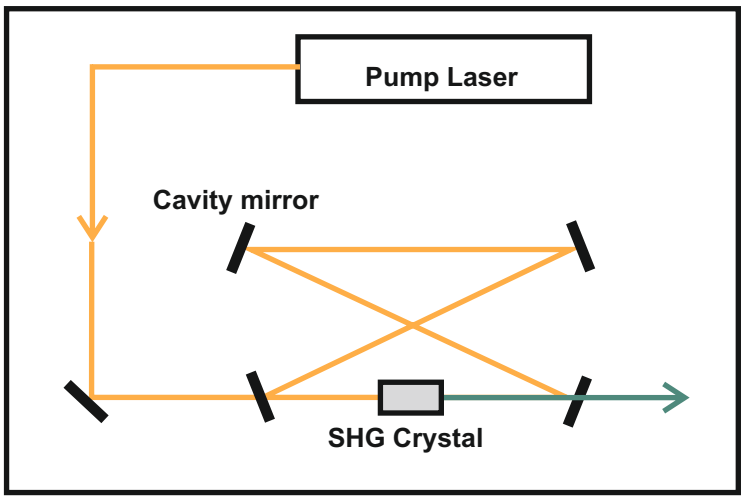
Vorsprung durch Innovation

Second harmonic generation mechanisms

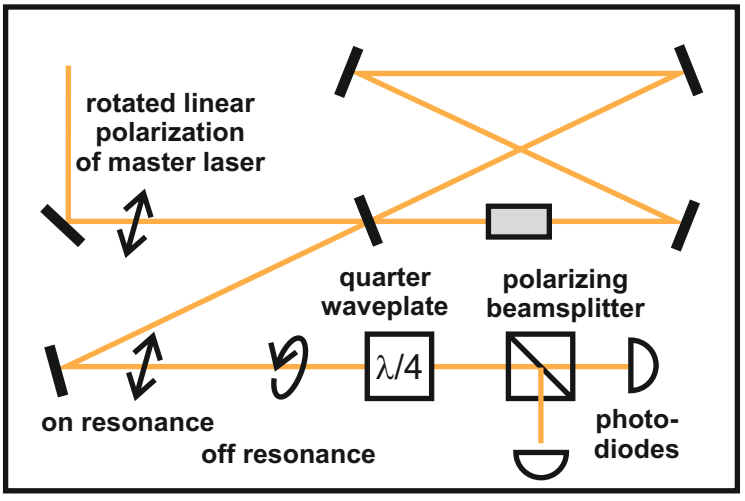
Second harmonic generation



SHG system schematics



Hänsch-Couillaud-Locking



Why second harmonic Generation?

Diode lasers are compact, robust, versatile and comparably cheap. However, the spectral coverage of laser diode omits some important wavelength region. UV, blue, yellow and green light (UV - 620nm) cannot be directly accessed with diode lasers.

The solution: SHG

Sacher Lasertechnik Group offers complete laser systems with a second harmonic generation stage to allow for laser sources in the above mentioned wavelength regions.
These stages can also be combined to access the quadrupled frequency.

How does it work?

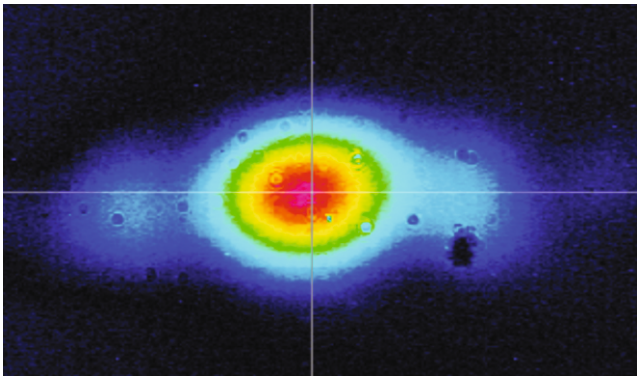
Second harmonic generation exploits nonlinear features of certain materials which lead to a generation of doubled frequency. An easy-to-understand way of explaining is that two photons are absorbed whereas only one is emitted, which then carries the double energy and thus is at double frequency.
For different wavelengths, different material has to be used. Therefore every such system is tailored to the individual customer.

Optical cavity

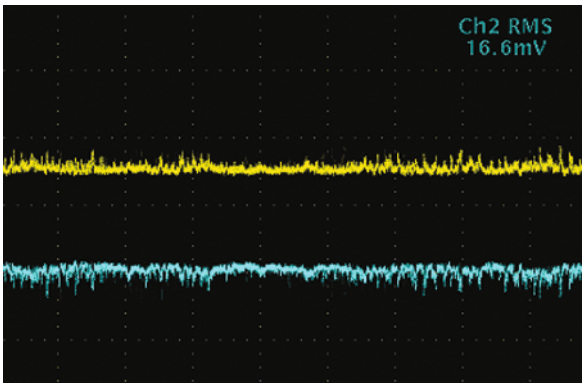
The use of an optical cavity is paramount for SHG generation since the nonlinear conversion efficiency is generally low. Therefore, the pump power is enhanced by using an optical cavity which is locked to the pump laser source. The locking mechanism is the Hänsch-Couillaud locking, which allows for modulation free stabilization of the cavity to the pump laser.

SHG system for Ca cooling & trapping wavelength 423nm, power 120mW

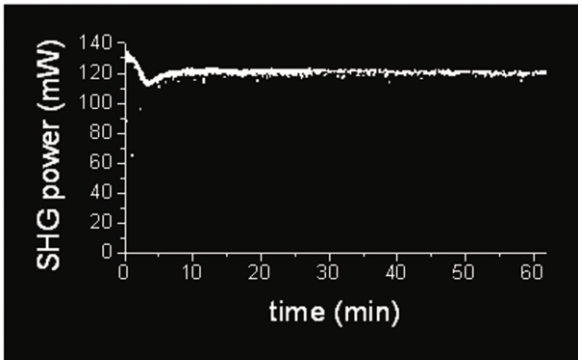
System performance



Excellent beam quality, typically $M^2 < 1.3$

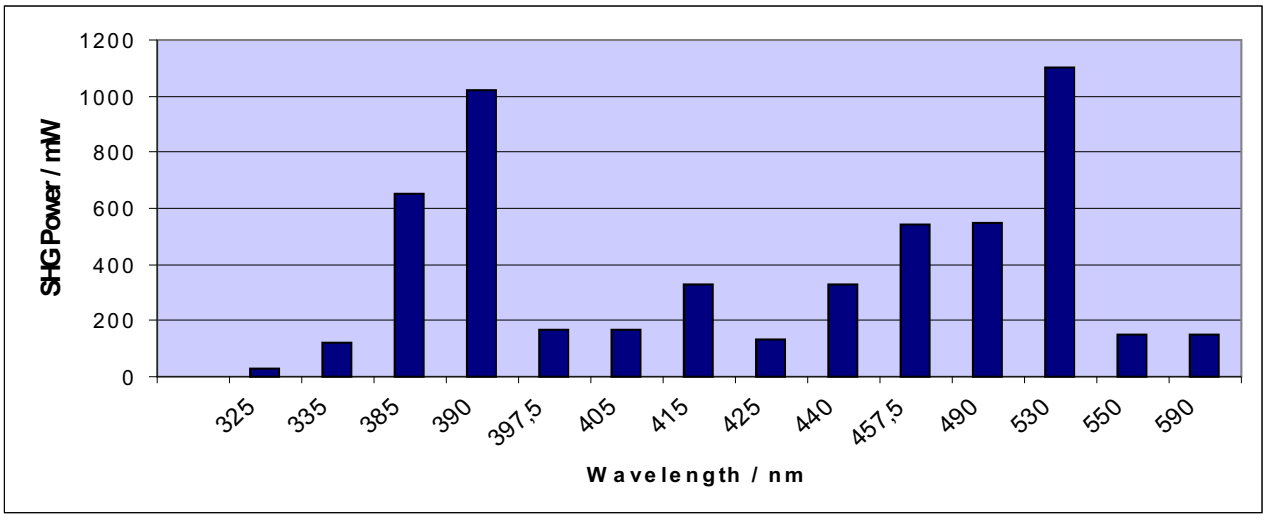


Low RMS noise, typically < 3%



High stability & short warm-up time typically < 20 min.

Spectral coverage



Applications

Atomcoolingandtrapping,(Ca,Sr,Rb..)

Interferometry

Lithography

Outlook

Fourth harmonic generation (FHG) further extends the spectral coverage by accessing deep UV radiation

- UV wavelengths between190 and 270nm
- UV power up to 50mW (depending on wavelength)

About Sacher Lasertechnik

Company Profile

Sacher Lasertechnik is a leading manufacturer of tunable external cavity diode lasers (ECDLs) with experience since 1992. The product range includes anti-reflection coated diode lasers, external cavity diode lasers in Littrow and in Littman/Metcalf configuration as well as laser driver electronics and sophisticated measuring electronics.

Please contact us with your measurement requirements. We would be proud to support you with our competence.

Please contact us or our local representative

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