Coherence matters.

HIGH PERFORMANCE LASERS

C-WAVE. Tunable lasers.

Cobolt. Single & Multi-line lasers.

C-FLEX. Laser combiners.

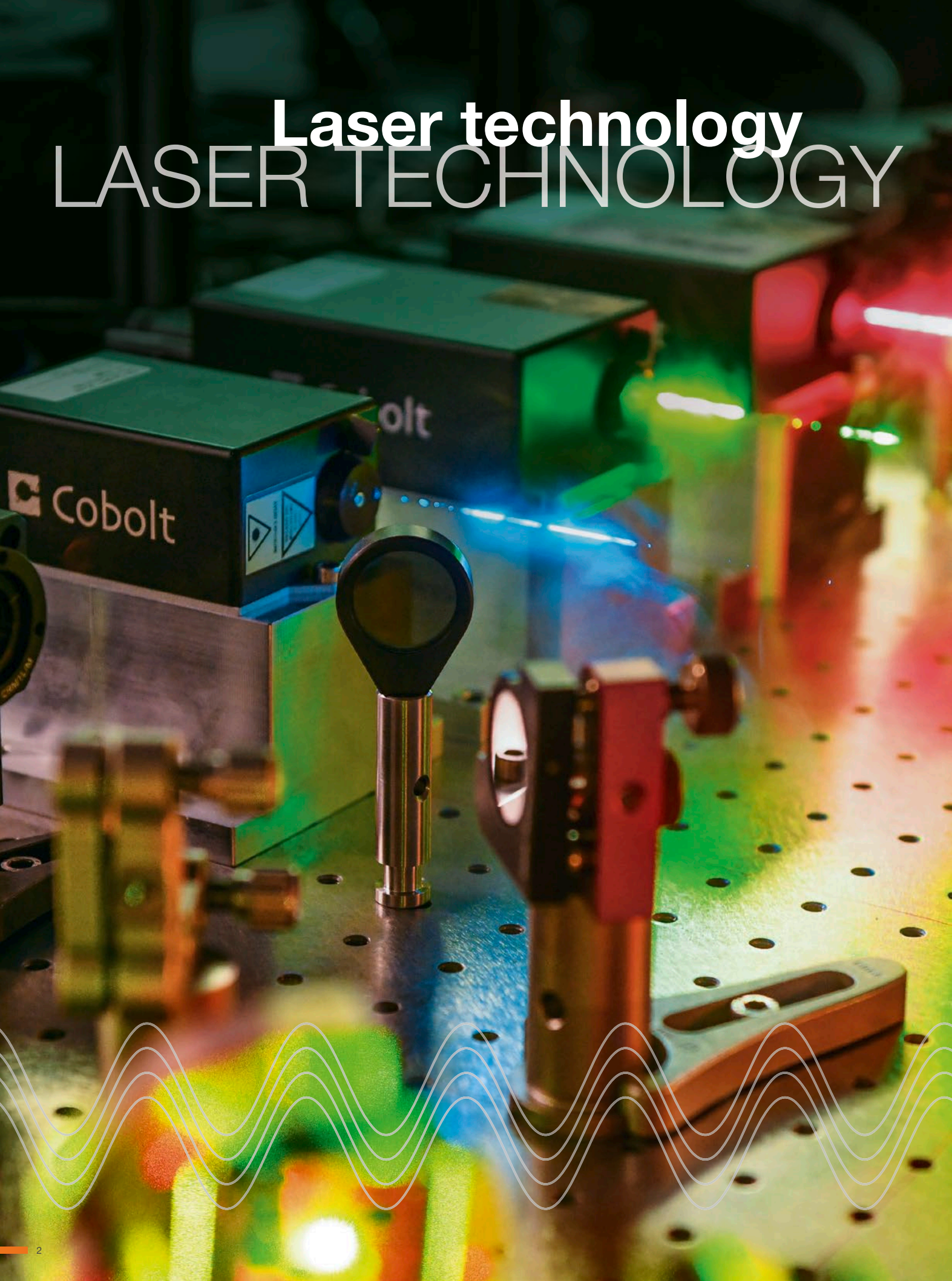
HÜBNER Photonics

hubner-photonics.com | coboltlasers.com

HÜBNER

Laser technology

LASER TECHNOLOGY



High performance lasers
A wide array of laser sources

Laser technology has come to have an indispensable role in scientific and medical research, in industrial production and even in many everyday applications from cosmetics to autonomous vehicles. At HÜBNER Photonics, our laser technology is offered in 3 product lines:

Cobolt – Single and multi-line lasers

Through the well-known Swedish laser manufacturer Cobolt, a proven supplier of high performance lasers of more than 15 years, HÜBNER Photonics offers one of the industry's broadest ranges of compact single-frequency CW lasers, diode lasers and Q-switched lasers across the full UV-Visible-MidIR spectrum. Using proprietary HTCure™ laser manufacturing technology, the Cobolt lasers are associated with outstanding reliability and product lifetime. The patented HTCure™ process is a technology for high precision mounting of optics that works with exceedingly high temperatures to provide outstanding durability in a highly compact design.

C-WAVE – Tunable laser

Complementing Cobolt's broad portfolio of compact lasers, the tunable lasers developed by HÜBNER Photonics cover an unusually wide spectrum and have gained a strong reputation throughout the industry. C-WAVE is one of the most unique kinds of lasers on the market – a single-frequency, CW, frequency doubled OPO (optical parametric oscillator), providing broadly tunable emission across the visible (and NIR) spectrum at the click of a button.

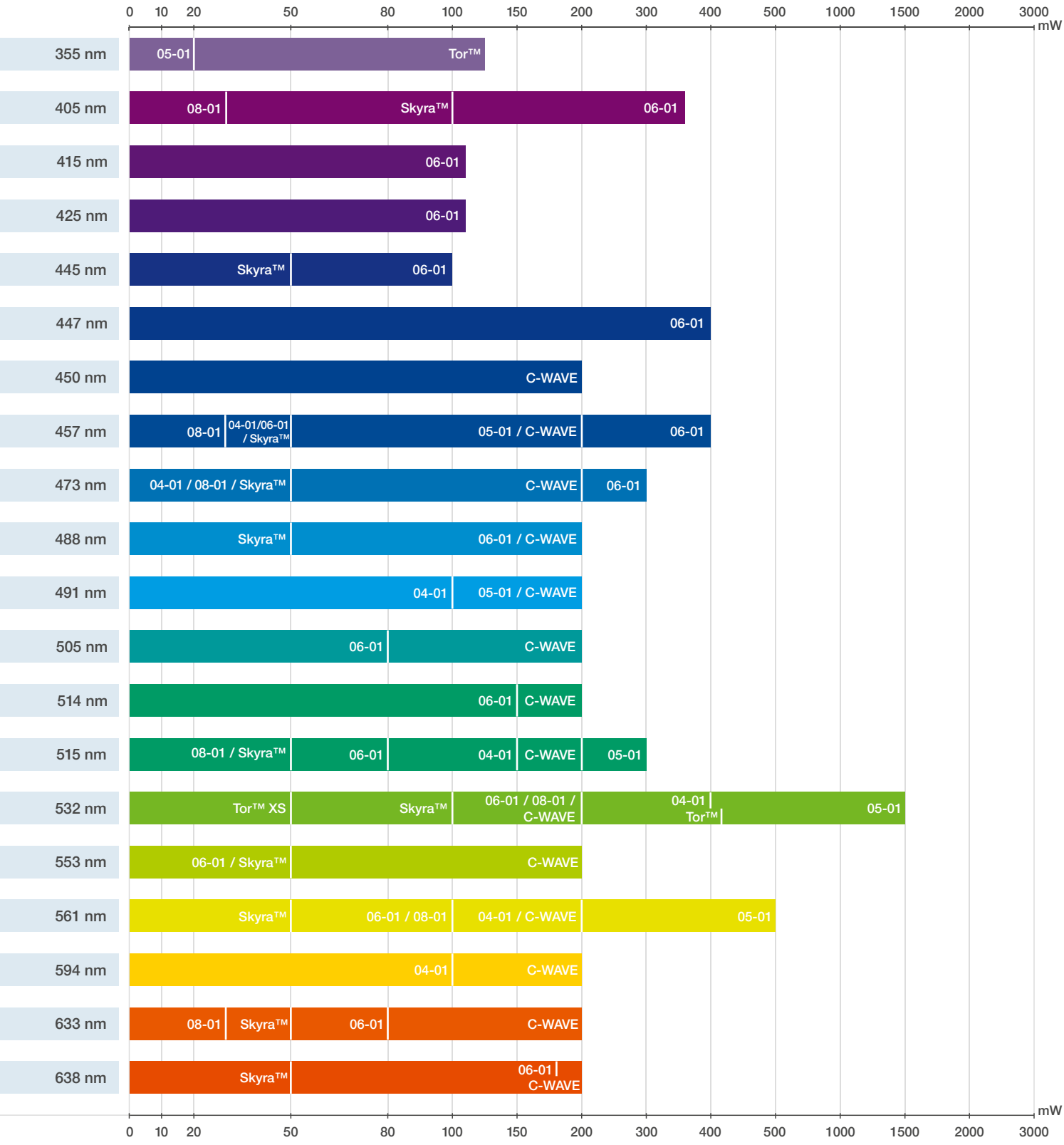
C-FLEX – Laser combiner

With the trend towards simplicity and user friendliness, the C-FLEX laser combiners offer the flexibitlity of combining any lasers from the extensive range of high performance lasers from Cobolt.

Our laser technology products –
A wide array of light sources

	C-WAVE** Tunable laser	Cobolt Odin™ Series Tunable Mid-IR OPOs	C-FLEX Laser combiner	Cobolt 04-01 / 05-01 Series Single frequency lasers	Cobolt 06-01 Series Modulated lasers	Cobolt 08-01 Series Narrow linewidth lasers	Cobolt Skyra™ Multi-line lasers	Cobolt Tor™ Series Q-switched lasers
355 nm				●				●
405 nm			●		●	●	●	
415 nm			●		●			
425 nm			●		●			
445 nm			●		●		●	
447 nm					●			
450 nm								
457 nm			●	●	●	●	●	
473 nm			●	●	●	●	●	
488 nm			●		●		●	
491 nm			●	●				
505 nm			●		●			
514 nm			●		●			
515 nm			●	●	●	●	●	
532 nm			●	●	●	●	●	●
553 nm			●		●		●	
561 nm			●	●	●	●	●	
594 nm			●	●				
633 nm			●		●	●	●	
638 nm			●		●		●	

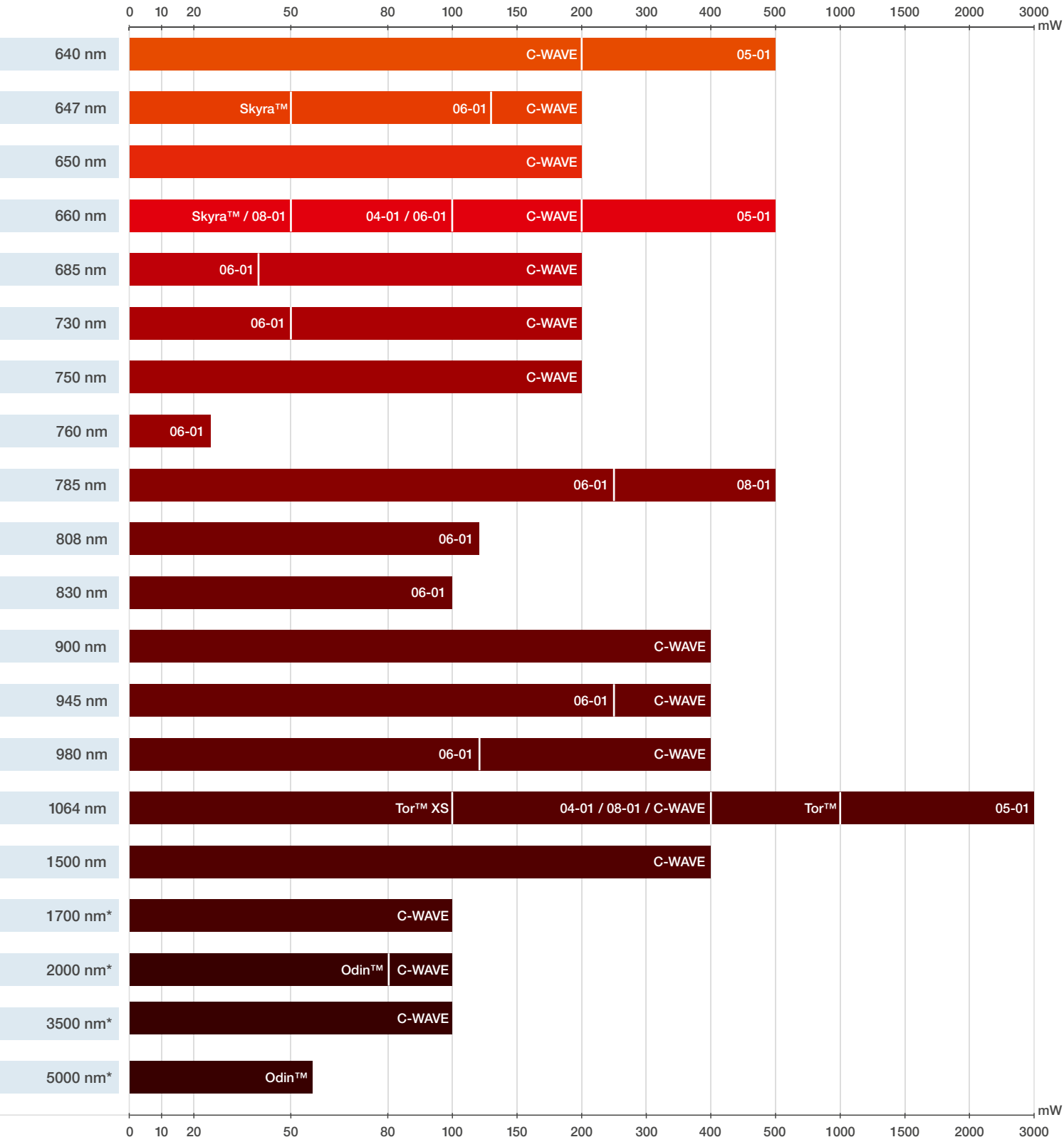
* Center wavelength selectable between 2-5um, tunable 50nm.
** C-WAVE typical powers can reach up to > 400mW in the visible and up to > 1W in the infrared wavelength range


0 10 20 50 80 100 150 200 300 400 500 1000 1500 2000 3000
mW
355 nm
05-01
Tor™
405 nm
08-01
Skyra™
06-01
415 nm
06-01
425 nm
06-01
445 nm
Skyra™
06-01
447 nm
06-01
450 nm
C-WAVE
457 nm
08-01
04-01/06-01 / Skyra™
05-01 / C-WAVE
06-01
473 nm
04-01 / 08-01 / Skyra™
C-WAVE
06-01
488 nm
Skyra™
06-01 / C-WAVE
491 nm
04-01
05-01 / C-WAVE
505 nm
06-01
C-WAVE
514 nm
06-01
C-WAVE
515 nm
08-01 / Skyra™
06-01
04-01
C-WAVE
05-01
532 nm
Tor™ XS
Skyra™
06-01 / 08-01 / C-WAVE
04-01
Tor™
05-01
553 nm
06-01 / Skyra™
C-WAVE
561 nm
Skyra™
06-01 / 08-01
04-01 / C-WAVE
05-01
594 nm
04-01
C-WAVE
633 nm
08-01
Skyra™
06-01
C-WAVE
638 nm
Skyra™
06-01
C-WAVE
mW
0 10 20 50 80 100 150 200 300 400 500 1000 1500 2000 3000

Our laser technology products –
A wide array of light sources

	C-WAVE** Tunable laser	Cobolt Odin™ Series Tunable Mid-IR OPOs	C-FLEX Laser combiner	Cobolt 04-01 / 05-01 Series Single frequency lasers	Cobolt 06-01 Series Modulated lasers	Cobolt 08-01 Series Narrow linewidth lasers	Cobolt Skyra™ Multi-line lasers	Cobolt Tor™ Series Q-switched lasers
640 nm	■			●				
647 nm	■		●		●		●	
650 nm	■							
660 nm	■		●	●	●	●	●	
685 nm	■		●		●			
730 nm	■		●		●			
750 nm	■							
760 nm			●		●			
785 nm			●		●	●		
808 nm					●			
830 nm					●			
900 nm	■							
945 nm	■				●			
980 nm	■				●			
1064 nm	■		●	●		●		●
1500 nm	■							
1700 nm*	■							
2000 nm*	■	■						
3500 nm*	■							
5000 nm*		■						

* Center wavelength selectable between 2-5um, tunable 50nm.
** C-WAVE typical powers can reach up to > 400mW in the visible and up to > 1W in the infrared wavelength range


0 10 20 50 80 100 150 200 300 400 500 1000 1500 2000 3000
mW
640 nm
C-WAVE
05-01
647 nm
Skyra™
06-01
C-WAVE
650 nm
C-WAVE
660 nm
Skyra™ / 08-01
04-01 / 06-01
C-WAVE
05-01
685 nm
06-01
C-WAVE
730 nm
06-01
C-WAVE
750 nm
C-WAVE
760 nm
06-01
785 nm
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08-01
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830 nm
06-01
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945 nm
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C-WAVE
1064 nm
Tor™ XS
04-01 / 08-01 / C-WAVE
Tor™
05-01
1500 nm
C-WAVE
1700 nm*
C-WAVE
2000 nm*
Odin™
C-WAVE
3500 nm*
C-WAVE
5000 nm*
Odin™
mW
0 10 20 50 80 100 150 200 300 400 500 1000 1500 2000 3000

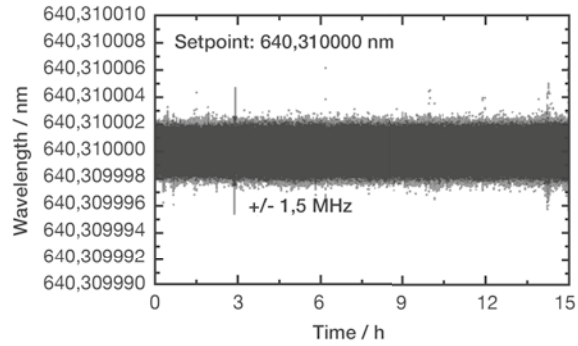
Applications

Lasers for **Quantum Optics**

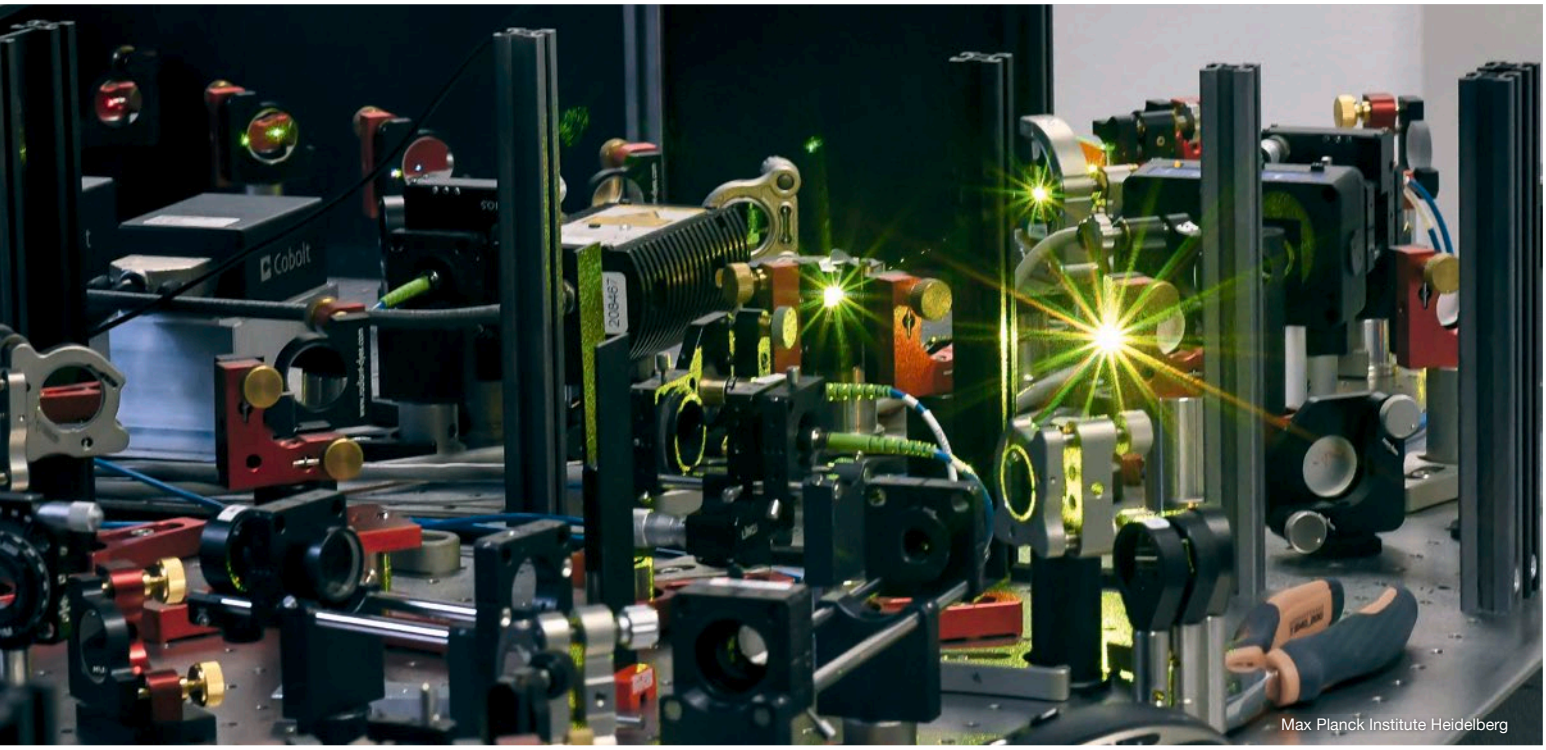
The field of quantum optics deals with the interactions of light and matter. In this still young discipline, photons or “light quanta” – the smallest particles of light – are investigated. The aim of this type of research is to gain an understanding of the overall behavior of electromagnetic waves.

The laser sources produced by HÜBNER Photonics play an important role in quantum optics research. This is especially the case with the tunable C-WAVE laser and Cobolt lasers with their high spectral purity and excellent wavelength stability. They provide exactly the flexibility and the precision that are essential for basic research applications.

- C-WAVE – Tunable laser, single frequency
- Cobolt – Modulated diode and single frequency lasers



Exemplary measurement of stabilized wavelength using AbsoluteLambda™.



Max Planck Institute Heidelberg

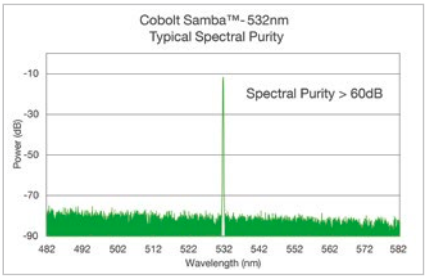
Applications

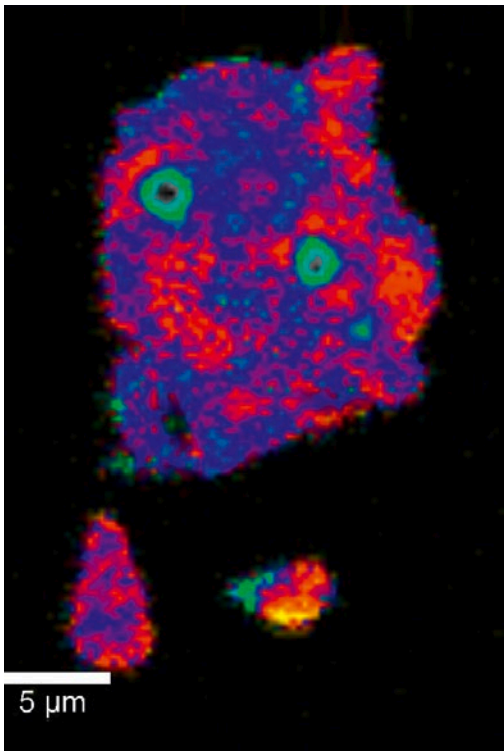
Lasers for **Raman Spectroscopy**

The “inelastic scattering of light” was first observed and identified by C.V. Raman in 1928. In 1930, he received the Nobel Prize in Physics for this work. But only in more recent times has it become possible to make use of the so-called Raman effect by which the frequency of light changes when it is deflected by molecules. In the past two decades, Raman spectroscopy has developed as a widely applicable method of examination – for fields ranging from material analysis to life sciences applications to point-of-care diagnostics. This has been made possible through the development of compact laser sources, highly sensitive cameras and compact high-resolution spectrometers.

With the lasers from Cobolt, HÜBNER Photonics has one of the widest ranges of products on the market for Raman spectroscopy applications. The Cobolt 08-01 Series of lasers, for example, has been specially developed for Raman applications with integrated Raman filters and optional isolators. Individual lasers can be combined with the C-FLEX laser combiner for added user friendliness. For applications requiring a tunable, single-frequency laser in the visible range, the C-WAVE laser is especially well suited.

- Cobolt – Single frequency and narrow linewidth lasers
- C-WAVE – Tunable laser, single frequency
- C-FLEX – Laser combiner





Applications

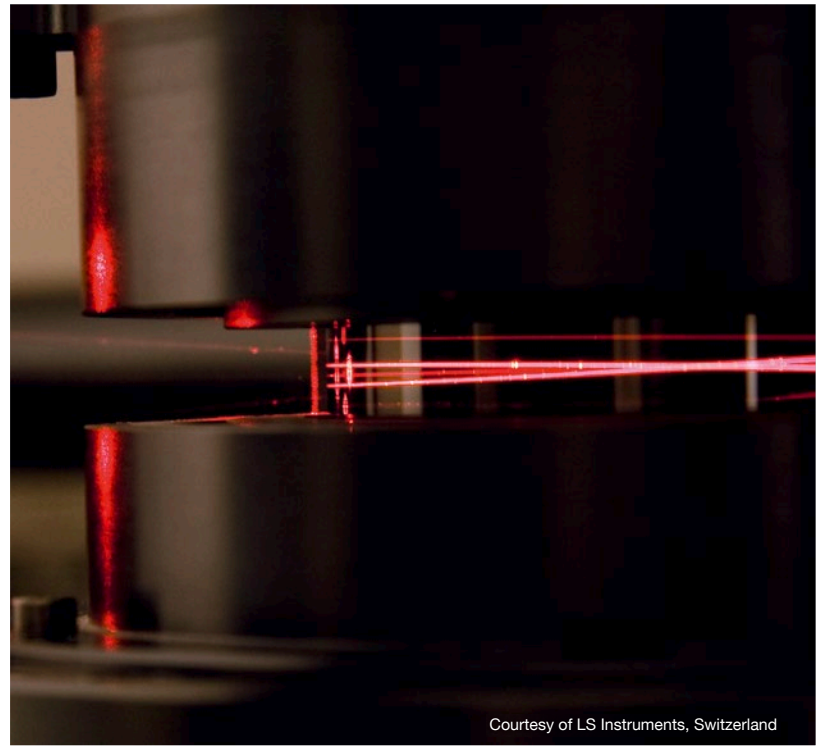
Lasers for **Interferometric Applications**

The term interferometry derives from the word interference. Interference is a phenomenon that occurs when two waves of any kind come together at the same time and place. Interferometry makes use of interference phenomena for measurement purposes, for example investigation of the flatness of an optical surface.

Even though there are many different types of interferometric based applications, all of them basically operate on the same principle. Two beams are separated and then combined so that they interfere with each other. In order to get interference a highly coherent laser source is required. The more coherent the laser beam, or the longer the coherence length, the finer the detail that can be resolved.

HÜBNER Photonics has one of the widest ranges of single frequency lasers in the industry for interferometric techniques, including holography, Doppler velocimetry and dynamic light scattering.

- Cobolt – Single frequency lasers
- C-FLEX – Laser combiner
- C-WAVE – Tunable laser, single frequency



Courtesy of LS Instruments, Switzerland

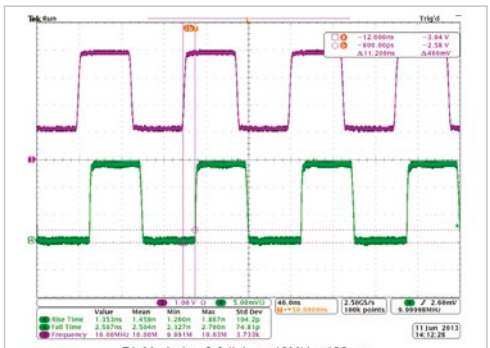
Applications

Lasers for **Life Science**

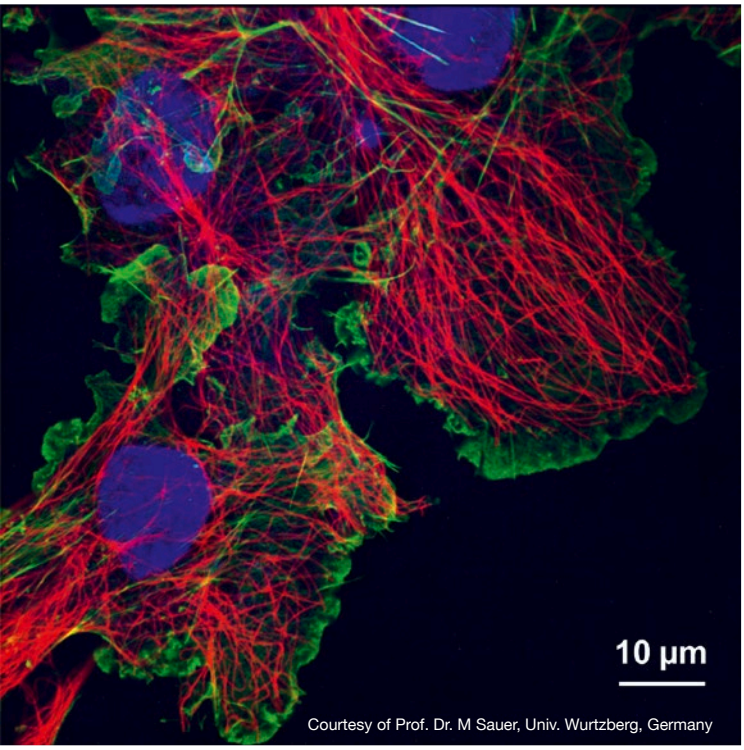
Significant applications in life science requiring CW lasers in the visible include fluorescence microscopy, flow cytometry and DNA sequencing. In all of these applications the fluorescence of specific fluorophores or biomarkers is detected, counted or imaged, leading to a deeper understanding of biochemistry.

With the lasers produced by Cobolt, HÜBNER Photonics can provide a broad portfolio of high-performance lasers for fluorescence microscopy applications. Not only do these lasers feature a standard integrated clean-up filter, at >70 dB they have one of the best modulation-extinction ratios in the industry. For greater convenience and ease of use, the individual lasers can be combined using the C-FLEX laser combiner.

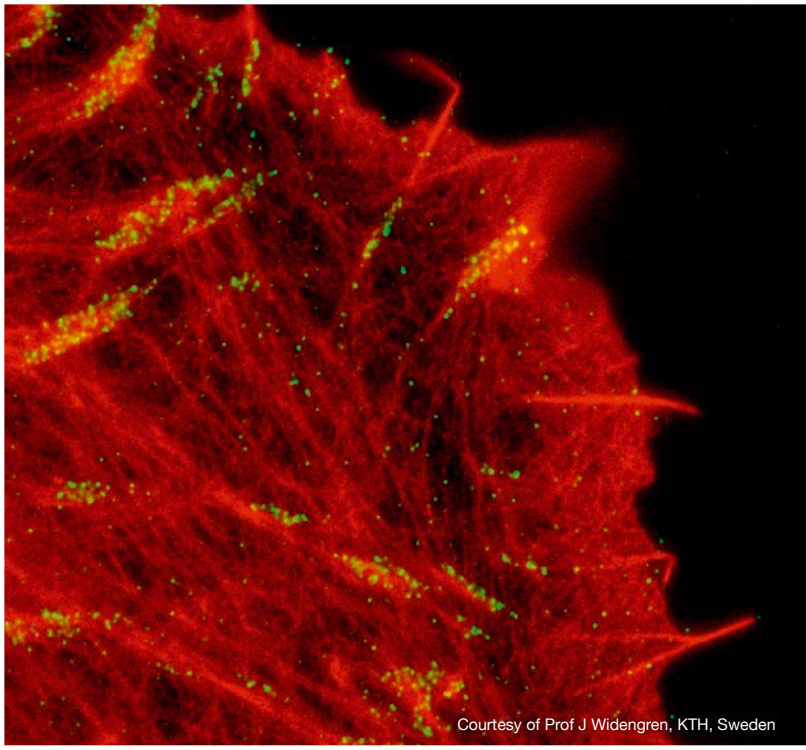
- Cobolt – Modulated lasers
- Cobolt Skyra™– Multi-line laser
- C-FLEX – Laser combiner



DigMod, rise & fall time, 10MHz, 488nm



Courtesy of Prof. Dr. M Sauer, Univ. Wurtzberg, Germany



Courtesy of Prof J Widengren, KTH, Sweden

HÜBNER Photonics

HÜBNER Photonics HUB Kassel
HÜBNER GmbH & Co. KG,
Heinrich-Hertz Strasse 2,
34123 Kassel, Germany
Phone: +49 561 998 0
Fax: +49 561 998 1515
E-mail: photonics@hubner-germany.com
www.hubner-photonics.com

Cobolt AB
Vretenvägen 13,
SE-171 54 Solna, Sweden
Phone: +46 8 545 912 30
Fax: +46 8 545 912 31
E-mail: info@coboltlasers.com
www.coboltlasers.com

Direct sales offices

HUBNER Photonics Inc
2635 North First Street, Suite 228,
San José, California, 95134, USA
Phone: +1(408)708 4351
Fax: +1(408)490 2774
E-mail: info.usa@hubner-photonics.com

HÜBNER Photonics UK
Royal Mail House, Terminus Terrace,
Southampton, Hampshire, SO14 3FD
United Kingdom
Phone: +44 2380 438701
E-mail: info.uk@hubner-photonics.com

ROW Sales: www.hubner-photonics.com

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