

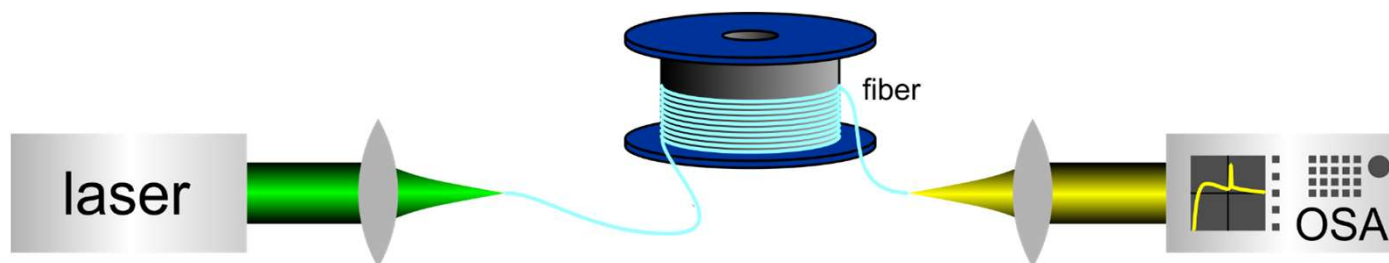
# NKT Photonics Supercontinuum

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# Supercontinuum basics



fiber with suitably designed dispersion and nonlinearity

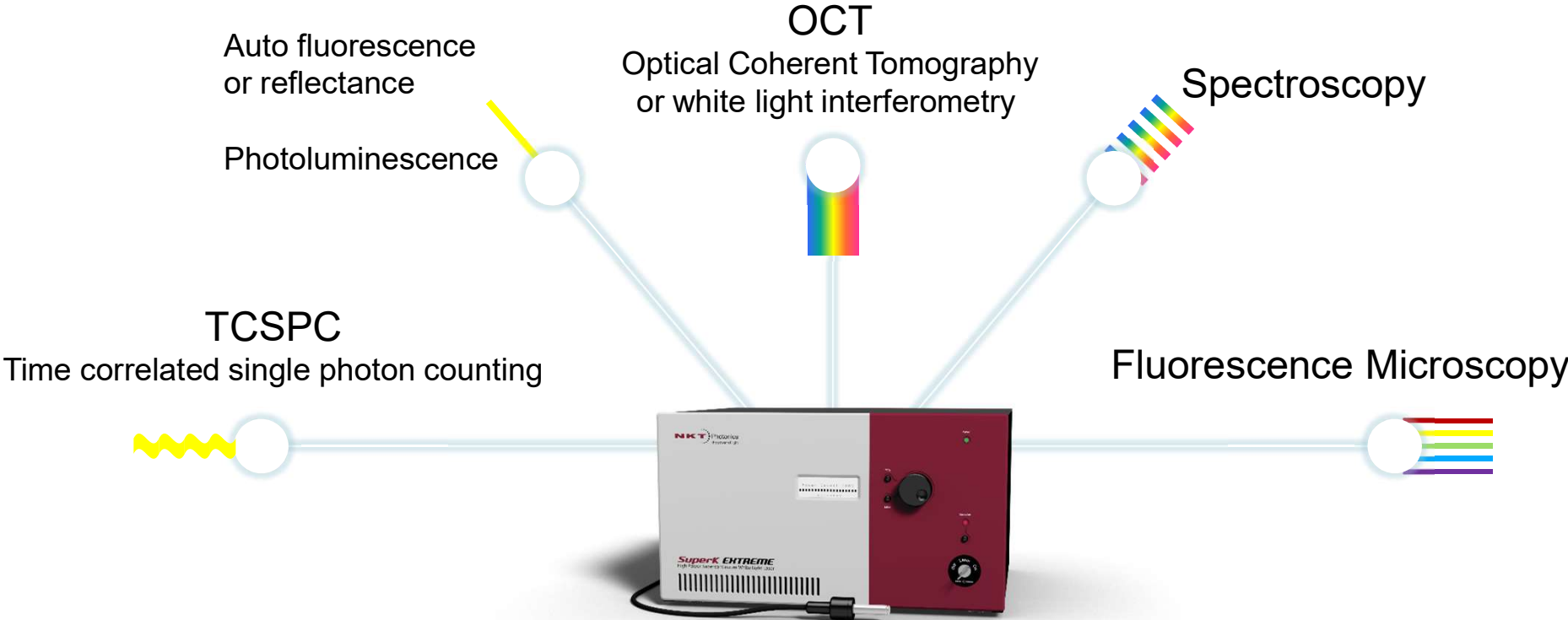
*supercontinuum generation* is the process where a **broad spectral bandwidth** is formed as a result of the **nonlinear interaction** of **laser light** and **matter**

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# One source, a variety of techniques



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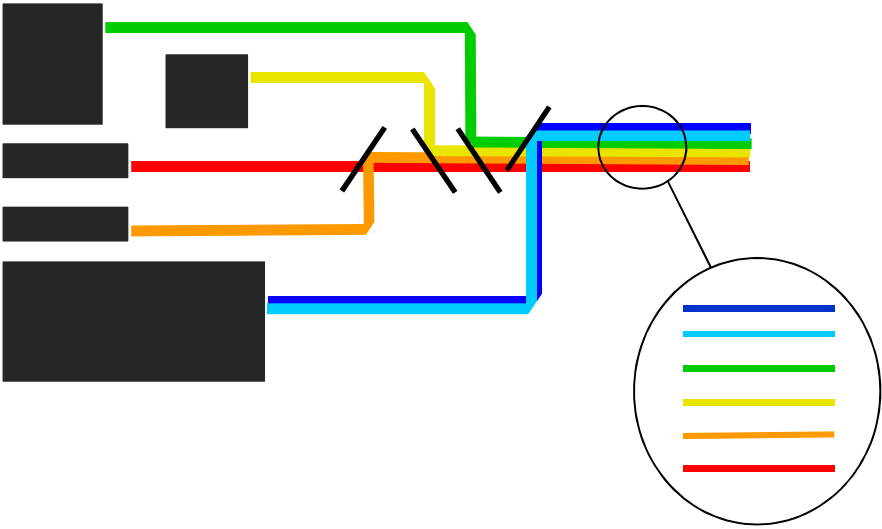
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# Multi-laser systems

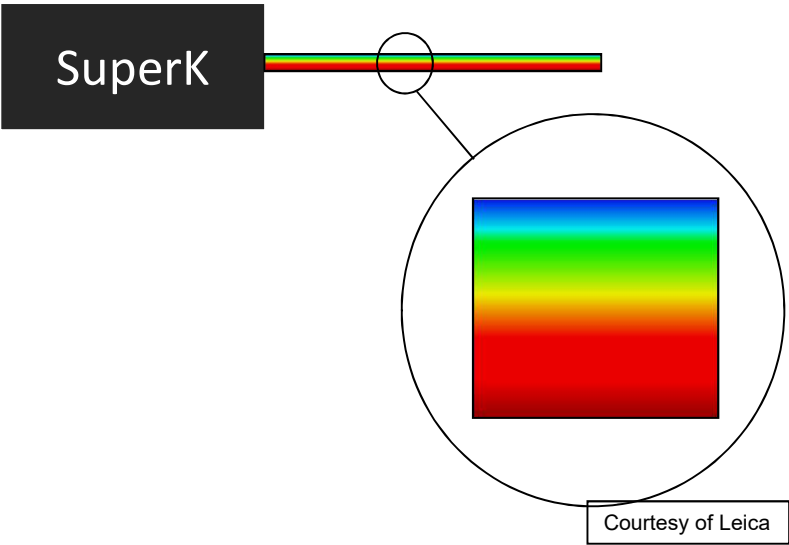
Yesterday

Merged set of conventional lasers



Today

One single source (White Light Laser)

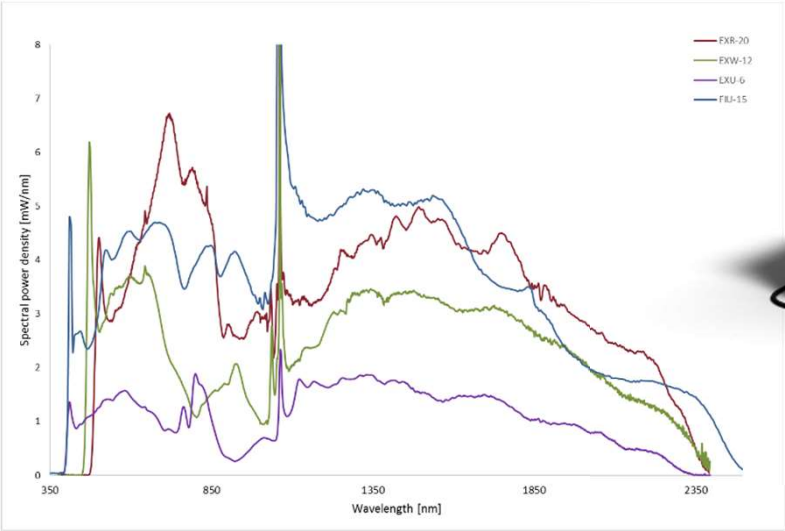


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# Supercontinuum lasers



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# Supercontinuum laser models

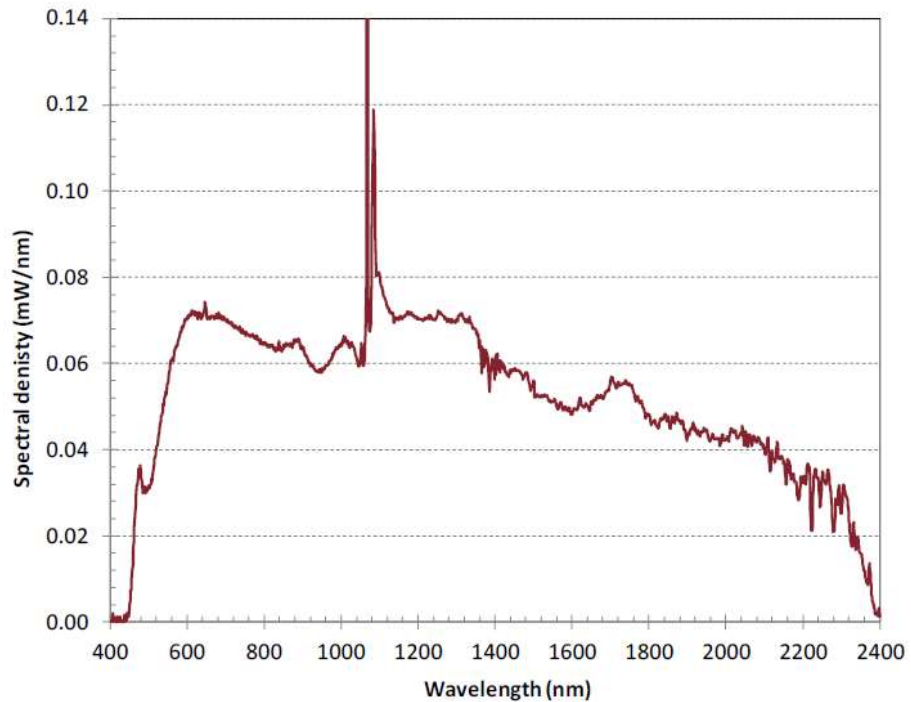
	Visible power level	Total power level	Repetition rate	Variable rep rate	Scientific use	Industrial use
<b>SuperK EVO OEM</b>	0.03-3 W	0.1-10 W	20-320 MHz			✓
<b>SuperK EVO</b>	>450 mW	>3 W	20 MHz		✓	✓
<b>SuperK MIR</b>	N/A	>450 mW	2.5 MHz		✓	
<b>SuperK EXTREME</b>	0.4-2 W	2-8 W	MHz	✓	✓	✓
<b>SuperK FIANIUM</b>	1.5 W	>7 W	MHz	✓	✓	
<b>Fianium Whitelase Micro</b>	25 mW	0.2-0.5 W	MHz		✓	✓
<b>SuperK COMPACT</b>	25 mW	0.1 W	kHz	✓	✓	✓
<b>SuperK OCT</b>	0.4-2 W	2-8 W	MHz		✓	

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# SuperK COMPACT



- Single mode output 450-2400nm
- Variable rep. rate from 1 Hz-20 kHz
- Easy to use turn-key system
- Total power 110 mW
- Trigger in and out
- Robust and reliable
- Instant-on

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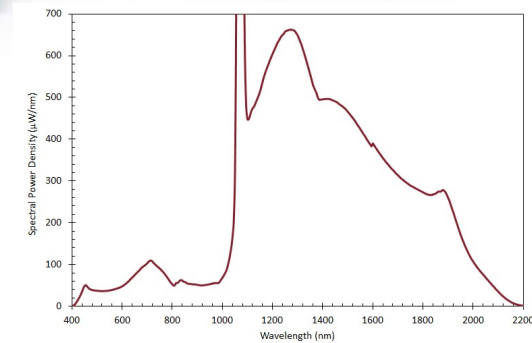
# Micro

- Affordable MHz supercontinuum laser
- 400-2000 nm output
- 25mW VIS power lever
- Simple interface through SW
- 30 MHz repetition rate



## Applications:

- T&M, characterization (lamp application)



# SuperK FIANIUM/EXTREME - Overview

- Single mode output 400-2400nm
- MHz-range variable rep rate
- Easy to use turn-key system
- Watt level output
- Robust and reliable
- Instant-on
- Compatible with spectral filters



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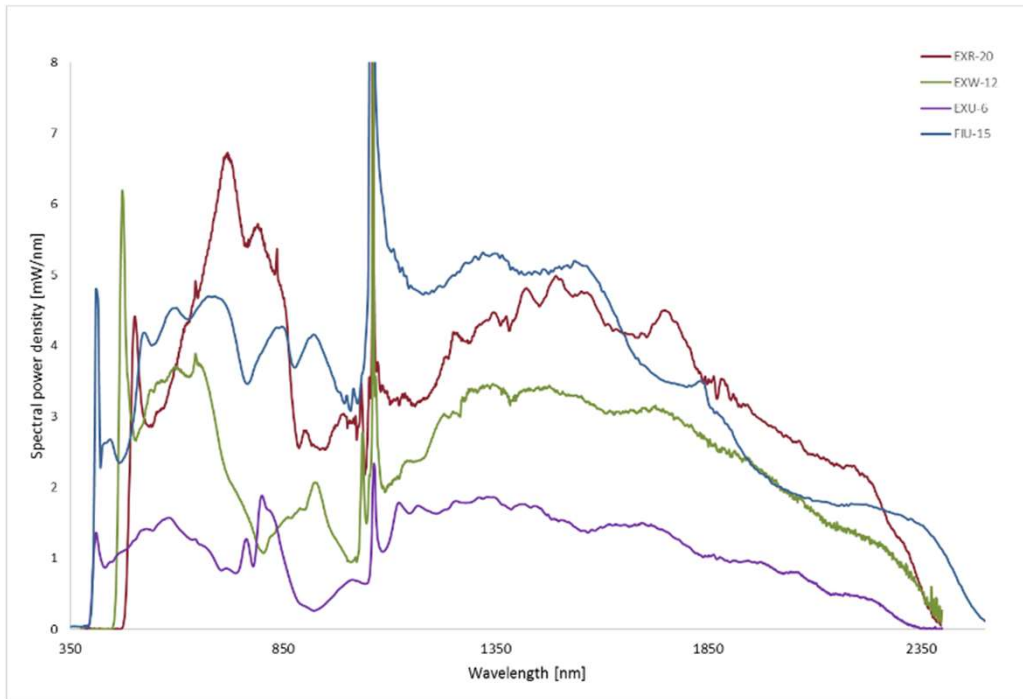
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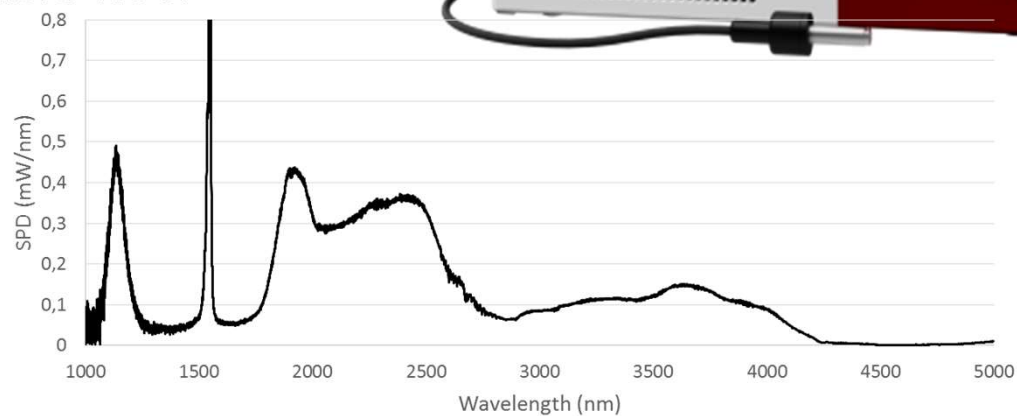
# SuperK FIANIUM/EXTREME



- EXR-20
  - Cut-in: ~480nm
  - VIS power: 2000 mW
- EXW-12
  - Cut-in: ~460nm
  - VIS power: 1200 mW
- EXU-6
  - Cut-in: ~400nm
  - VIS power: 600 mW
- FIU-15
  - Cut-in: ~410nm (SM >430nm)
  - VIS power: 1500 mW

# SuperK MIR

- 2.5 MHz
- 1100 – 4200 nm
- Total power > 450 mW
- DEMO source is available now

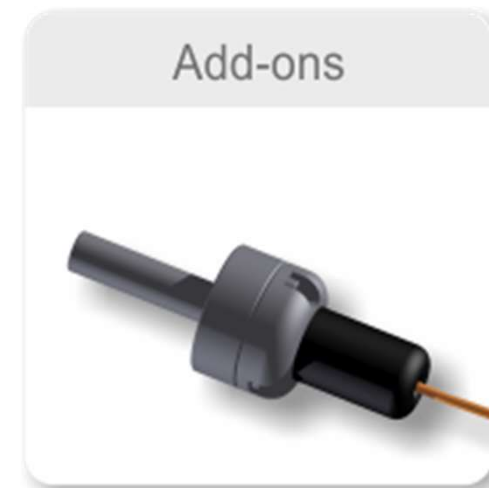
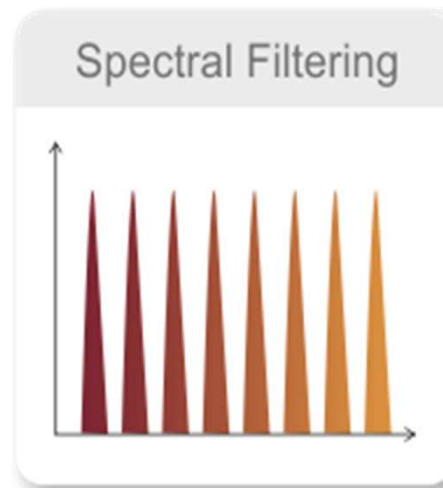
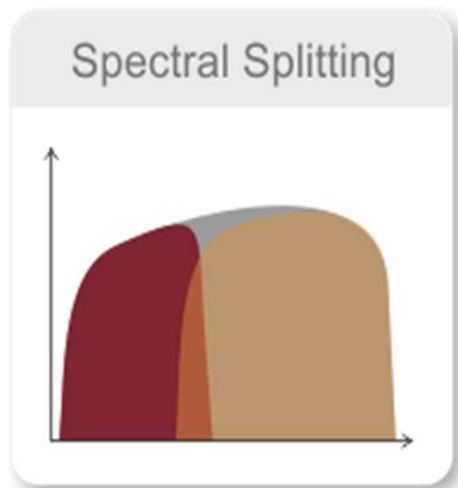


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# Accessories and filtering



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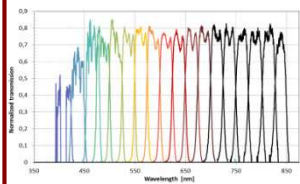
# Supercontinuum accessories

## VARIA



### Variable bandpass filter

Tunable laser with variable bandwidth  
 400 nm – 840 nm tuning range  
 10-100 nm tunable bandwidth  
 50 dB suppression  
 85 % Transmission

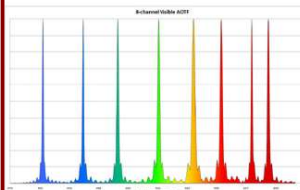


## SELECT



### Multi-Wavelength AOTF

Multi-line tunable laser (AOTF)  
 Up to 16 simultaneous channels (8 per crystals over two outputs)  
 30 dB suppression  
 Polarized output  
 40 % Transmission



## LLTF



### Narrow laser line filter

Tunable high-resolution bandpass filter  
 1,5 nm – 2,5 nm bandwidth for VIS  
 400 – 1000 nm single out put (VIS)  
 1000 – 2300 nm single output (IR)  
 65 dB suppression  
 65 % Transmission

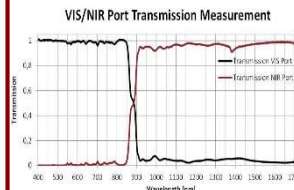


## SPLIT



### Broadband filter

400-830/915-2400 nm with separate optical outputs  
 Custom splitting wavelengths possible

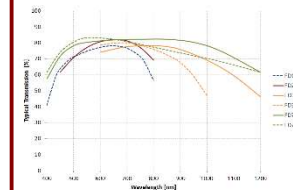


## CONNECT



### Delivery fiber

Different single-mode fibers for 400-2000 nm range  
 High coupling efficiency  
 Broadband PCFs available  
 Different output connectors



## EXTEND-UV



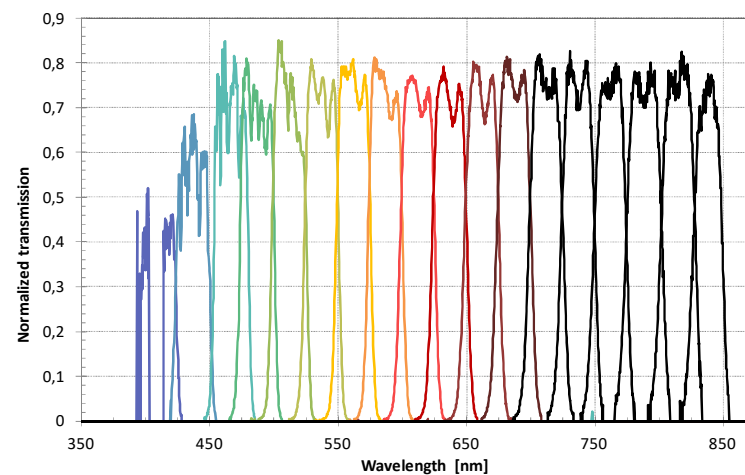
### Tunable UV source

265-350 nm / 350-480 nm  
 ~3-10 nm linewidth  
 ~100 μW power levels



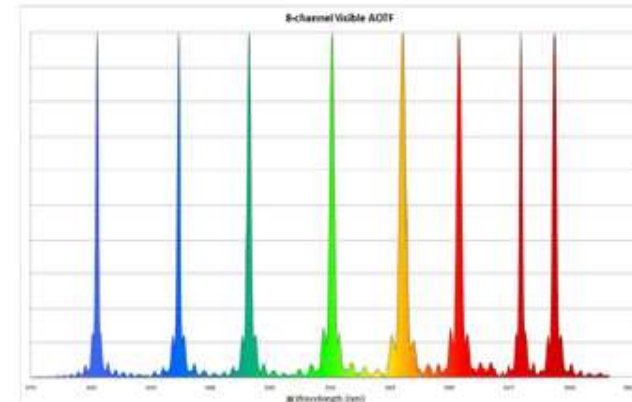
# SuperK VARIA single line tunable filter

- Convert the SuperK to a single-line tunable laser with variable linewidth
- 400-840 nm tuning range
- 10-100 nm bandwidth\*



# SuperK SELECT

- Convert the SuperK to a multi-line tunable laser
- Up to 8 simultaneous channels
- Fast tuning and switching



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# Laser Line Tunable Filter (LLTF)

- Plug-and-play grating-based electronically tunable filter
- Single channel
- Broad wavelength coverage
  - Visible version: 400-1000nm
  - NIR Version: 1000-2300nm
- Exceptional out-of-band blocking >60dB
- Narrow bandwidth
  - Visible version: 2.5nm
  - NIR version: 5nm
- Optional Fiber Delivery (FDS) to single or multimode fiber



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# SuperK Extend UV



Model	Wavelength range	Typ power with EXW-12	Typ power with EXR-20
DUV	265-345 nm	2-10 $\mu\text{W}$	3-30 $\mu\text{W}$
UV	350-480 nm	18-80 $\mu\text{W}$	70-170 $\mu\text{W}$

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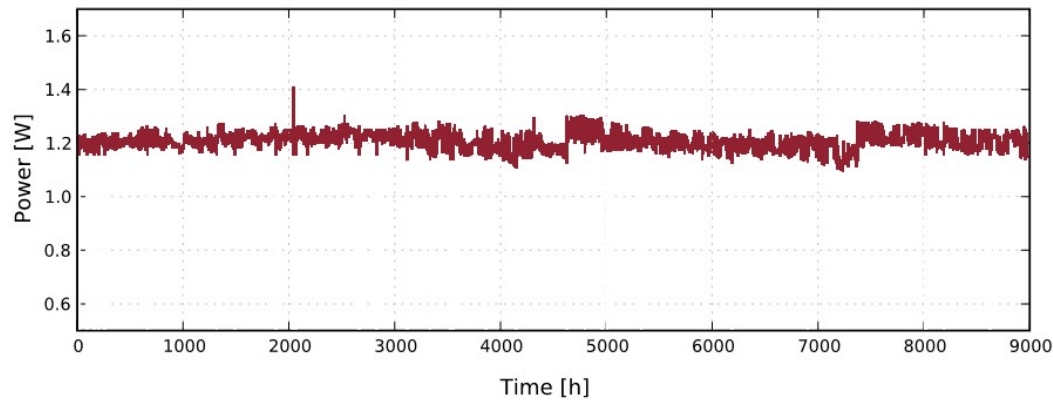
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# Laser Lifetime

## Supercontinuum engine

- The laser engine primarily consist of standard reliable components used for telecom with expected lifetime of 10.000 hours and an expected failure rate is <3% within the first 2 years.



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# Supercontinuum Applications

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# All Purpose Lab Tool

- Plug & play fiber delivery, splitters and filters
- Replaces multiple single-line and broadband sources



# One Source – Multimodality applications

Auto fluorescence

OCT  
Optical Coherent Tomography

Spectroscopy

TCSPC

Time correlated single photon counting

Fluorescence Microscopy

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# Major Application / Technique Fields

Bio photonics	Materials	Spectroscopy	T&M
AOSLO	Plasmonics/Meta	CRDS	Astro
OCT/LCI	Nanoparticles	FTIR	Telcom (Fiber)
DOT/DOI	QDots	Hyperspectral	Radiometry
Time-res. fluorescence	PL		TFF
FLI(M) / FRET / FC(L)S	Solar		Ellipsometry
CONFOCAL / SPIM	Semiconductor		Sensor calibration
STED	Graphene/CNT		
PIE	Diamond NV Center		

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