The SCH
A New Broadband Ultrashort Pulse Supercontinuum Laser for Multiphoton Microscopy
New Horizons in Two-Photon Microscopy

Increased photon flux, improved two-photon generation and simultaneous multilabel excitation.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Duration</td>
<td>≥ 15 fs</td>
</tr>
<tr>
<td>Repetition Rate</td>
<td>75 MHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>950-1150 nm</td>
</tr>
</tbody>
</table>
The SCH laser is a new class of femtosecond supercontinuum fiber laser, ideal for two-photon excitation of red-shifted indicators such as DsRed and EYFP. Powered at the core by FYLA’s proprietary technology, it provides extremely short pulses (15 fs at the sample plane) and a very broad spectral bandwidth (950-1150 nm), enhancing two-photon excitation and enabling the individual or simultaneous excitation of bountiful indicators.

When integrated into a two-photon microscope, the SCH unparalleled short pulses are dynamically pre-compensated to account for the dispersion introduced through the microscope optical path. This ensures the shortest Fourier-Transform pulses at the sample plane.

At a constant average power, the SCH provides peak powers which achieve more than 7-fold photon flux improvement compared with the conventional single-line 100-200 fs lasers used in two-photon microscopy, enabling enriched observation while maintaining low average power.

Based on fiber technology, the SCH is air-cooled, highly robust and compact and the control unit can be mounted at several meters from the microscope. It can be easily combined with most commercial and home-made two-photon microscopes to create a unique platform for two-photon imaging and with straightforward installation.
A Rich Variety of Imaging Probes

The newly-developed SCH provides an extremely wide spectral bandwidth which expands in the NIR across the 950-1150 nm spectrum. It overlaps with the two-photon excitation spectra of most red-shifted indicators, including the DsRED and eqFP578 families, reaching as far as some green fluorescent indicators such as eGFP. It remarkably exceeds the range of indicators that can be excited with conventional single-line femtosecond fiber lasers which makes it a highly flexible and versatile laser for two-photon excitation fluorescence microscopy.

I) Blue Curve: SCH optical power per nm versus wavelength in logarithmic scale.
II) Red Line: Narrowband 100 fs fiber laser at 920 nm (optical power up to 120 mW/nm.)
III) Yellow Line: Narrowband 100 fs fiber laser at 1050 nm (optical power up to 200 mW/nm.)
IV) Orange Circles: Cross sections (secondary vertical axis) of most common two-photon red fluorophores as a function of excitation wavelength.

The SCH The Supercontinuum Fiber Laser for Two-Photon Microscopy
A Boundless Flux of Photons

An unparalleled photon flux is delivered by the SCH to the sample, reaching more than 7-fold the photon flux of conventional 100-200 fs fixed-wavelength and broadly tunable lasers at constant average power.

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I) Photon flux at the center of:
   a) Blue Curve: SCH-15 fs, 75 MHz, 50 mW.
   b) Orange Curve: Laser of 100 fs, 80 MHz, FWHM:13 nm, 50 mW.
II) Grey Curve: Cross section spectrum of the fluorophore DsRed (secondary vertical axis)
Extraordinarily Efficient

The large photon flux associated to the superior SCH peak power leads to an increased number of photons that reach the sample per area and time, massively enhancing the two-photon excitation efficiency when compared with conventional fixed-wavelength or broadly tunable 100-200 fs lasers.

Average number of times a molecule of DsRed fluorophore gets excited by a pulse of
a) Blue Curve: SCH-15 fs, 75 MHz, 50 mW, FWHM:110 nm.
b) Orange Graph: Laser of 100 fs, 80 MHz, 50 mW FWHM:13 nm.
A Continuum of Multi-Coloured Excitation

The SCH broad spectral bandwidth not only enables the excitation of a large range of indicators but it also permits the multicolor excitation across the 950-1150 nm range with a single scan, making simultaneous excitation of different probes possible. This eliminates alignment issues compared to multiple-channel beam solutions.

I) Blue Curve: SCH optical power per nm versus wavelength in logarithmic scale.
II) Two-photon cross-section (secondary vertical axis) of Citrine fluorophore (in yellow) and tdKatushka2 (in red) as a function of excitation wavelength.
Compact, Robust, Simple

Dimensions in mm
The Supercontinuum Fiber Laser for Two-Photon Microscopy

**Spectral Coverage**

*Calculated with D-Scan of Sphere Ultrafast Photonics*

**Beam Profile**

**Pulse Duration**

Pulse width 14.14 fs

**Spectral Coverage**

SCH Optical Power Spectra
## Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Average Power</td>
<td>&gt;250 mW</td>
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<tr>
<td>Pulse Duration</td>
<td>15 - 1000 fs</td>
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<tr>
<td>Spectral Coverage</td>
<td>950 - 1150 nm</td>
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<tr>
<td>Repetition Rate</td>
<td>75 MHz</td>
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<tr>
<td>Power Stability</td>
<td>&lt;0.5% over 3h</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear</td>
</tr>
<tr>
<td>Output Port</td>
<td>Fibre or with dispersion compensation module</td>
</tr>
<tr>
<td>Optical Output</td>
<td>Collimated, Single mode across full spectrum</td>
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<tr>
<td>Beam Diameter</td>
<td>2.4 mm (1/e² at 1064 nm)</td>
</tr>
<tr>
<td>M² Parameter</td>
<td>&lt; 1.2</td>
</tr>
</tbody>
</table>

Specifications are subject to change without any notice or obligation on the part of the manufacturer.
We Laser the New Industry