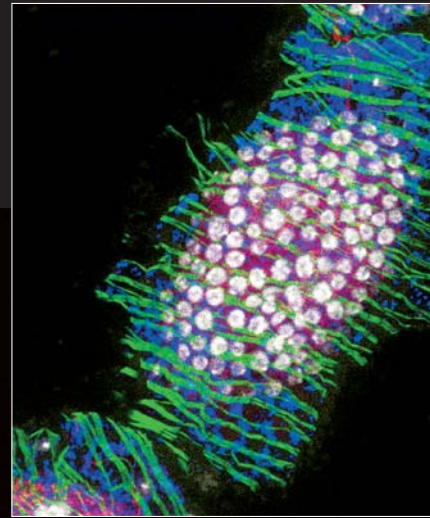
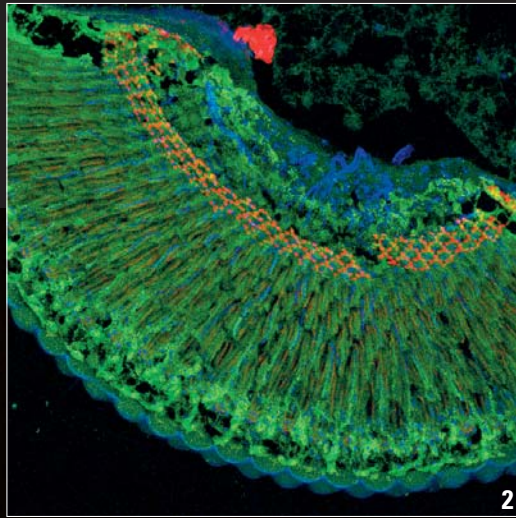
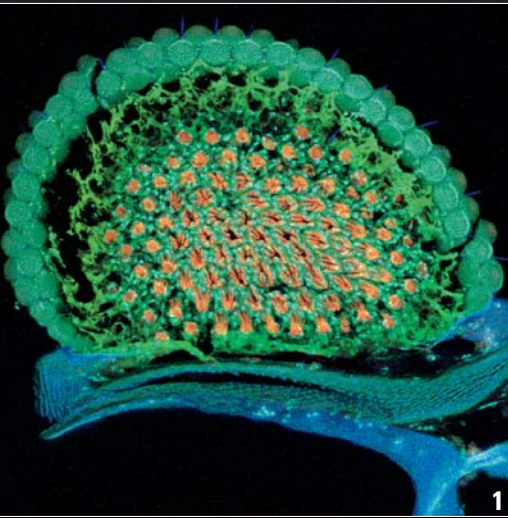




# Reach High!

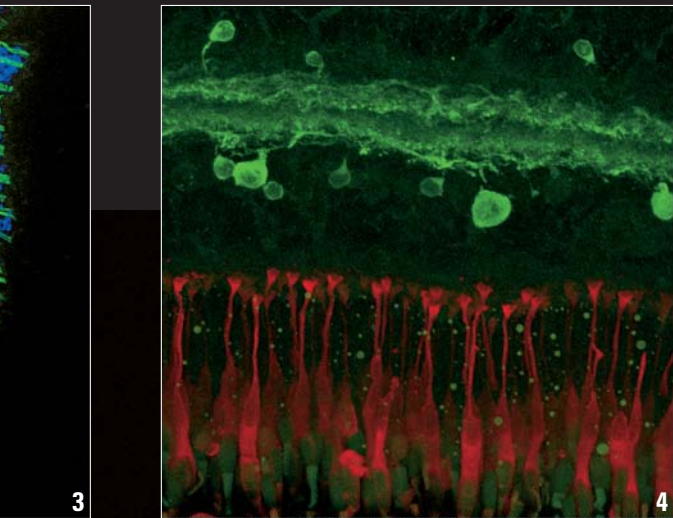
The New Leica TCS SP5 – The Only Broadband Confocal

*Leica*  
MICROSYSTEMS

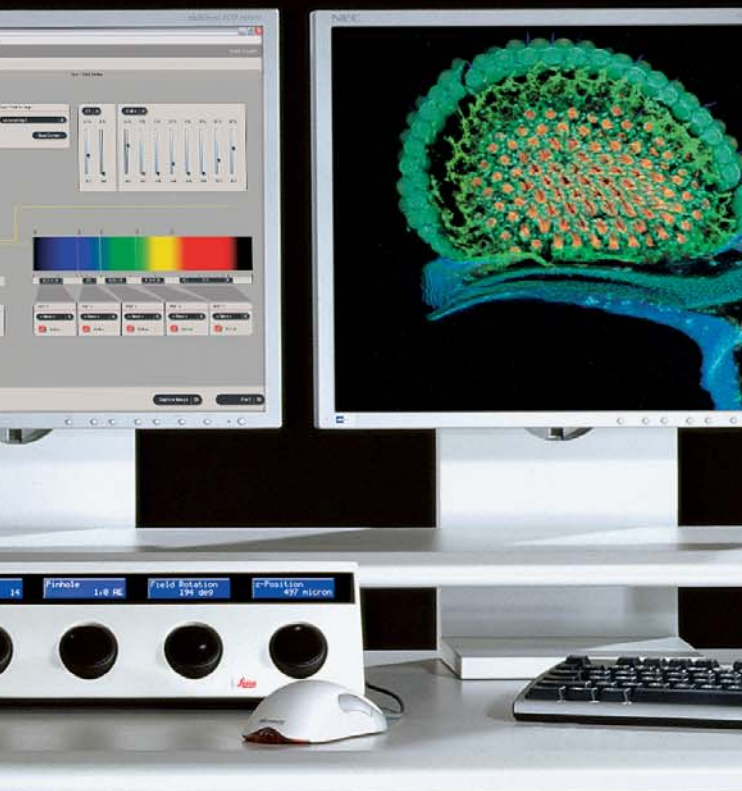


- High-speed Live Cell Imaging
- The Fastest True Confocal System
- Leading in Multispectral Imaging
- Intelligent and Intuitive Interactions





ng and High Resolution Morphology – All in One  
System  
aging  
urface



Today, biological and medical research in advanced fluorescence has evolved into two different directions: on one hand scientists want to record brilliant, high-resolution images to illustrate morphological features of fixed or slowly moving live samples. On the other hand, high-speed dynamic processes in live cells are monitored by fast time-course studies, from which significant quantitative data are extracted.

## Reach High!

### The Only Broadband Confocal: Uniting Two Worlds

In Confocal Microscopy, these apparently opposing worlds have led to the development of two classes of systems: Those which are optimized for morphological image acquisition or those designed for high-speed live cell imaging and data generation.

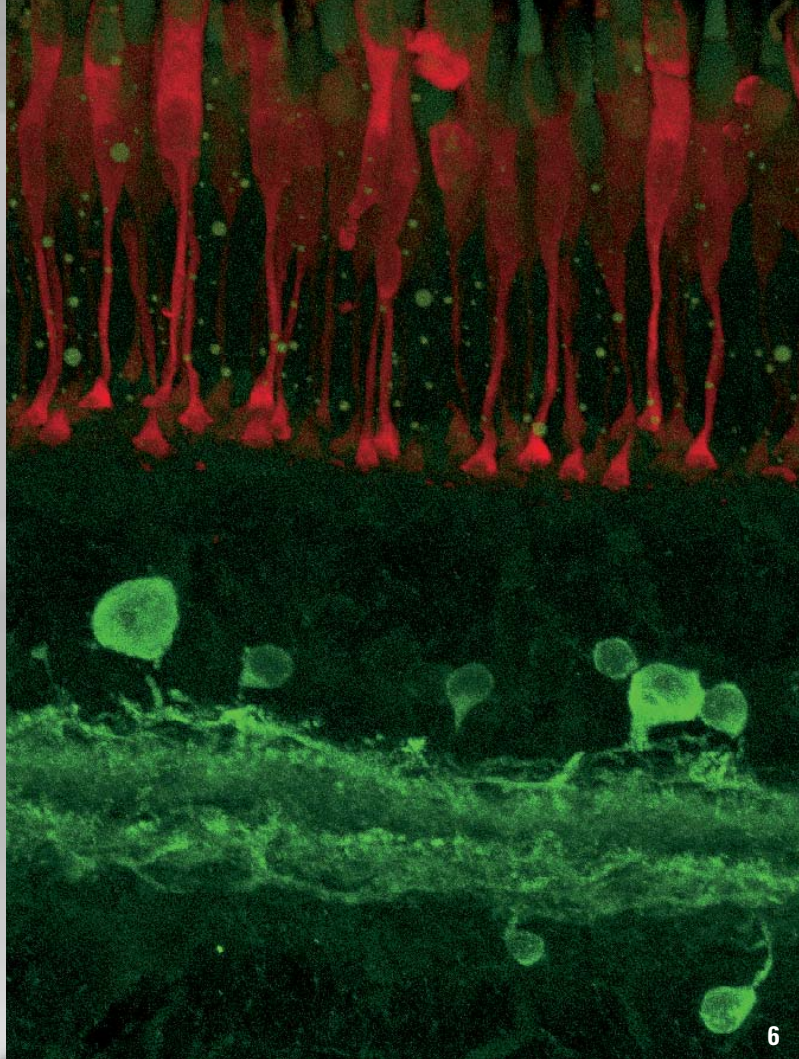
Until now, research in a multi-user laboratory, where both aspects are equally important, requires investment in two dedicated systems.

#### The broadest band of Imaging Speeds with the new Leica TCS SP5

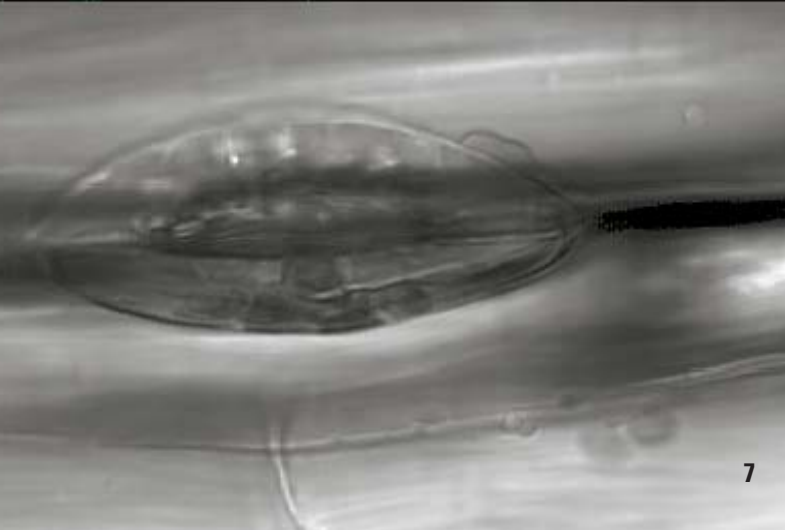
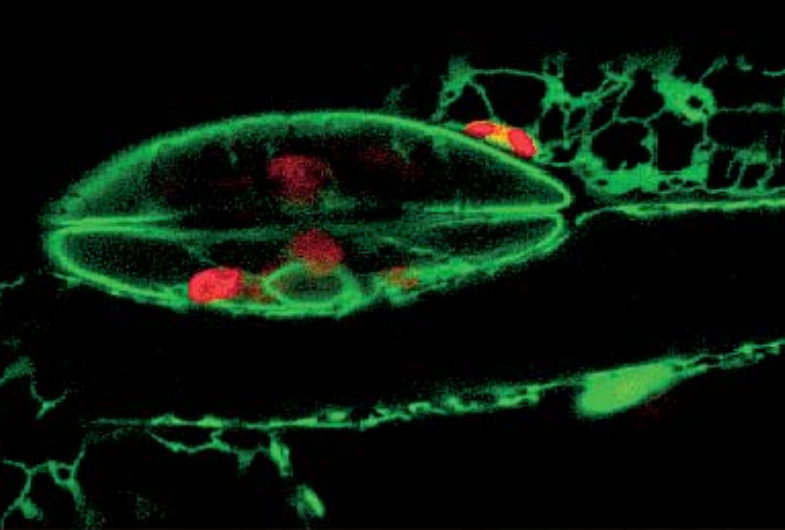
In close cooperation with leading scientists, we have developed the new system Leica TCS SP5 which covers the wide range of imaging speeds from spot recording to real-time imaging in a single truly confocal platform. This new broadband confocal microscope system perfectly merges two worlds in one.

And broadband means more than only speed: The system accomplishes the most demanding requirements in recent multi-fluorescence research by groundbreaking new technologies to maximize spectral and multichannel performance. The Leica TCS SP5 is made to meet your needs as a scientist who wants to reach higher.





6



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# High Speed and High Resolution – All in One

Profit From the Full Range of Scan Speeds in One Single System

**Why choose between a hi-resolution morphology system and a real-time live cell imaging system when you can have it all in one? As fast as you need it, as hi-res as your work demands – the new Leica TCS SP5 is a true broadband confocal and finally covers the full range of scan speeds in one single system.**

## **Switch speed in an instant**

The new Leica TCS SP5 comes with a tandem-scanning system mounted on a sliding device. This set-up enables you to easily switch between conventional and resonant scanner. Whereas the conventional scanner serves for all morphology and classical speed live cell applications, as well as beam-parking for fast intensity monitoring and FRAP (Fluorescence Recovery After Photo-bleaching) experiments, the resonant scanner provides you with a whole range of high speed options. This flexible combination makes the Leica TCS SP5 an ideal device for multi-user facilities.

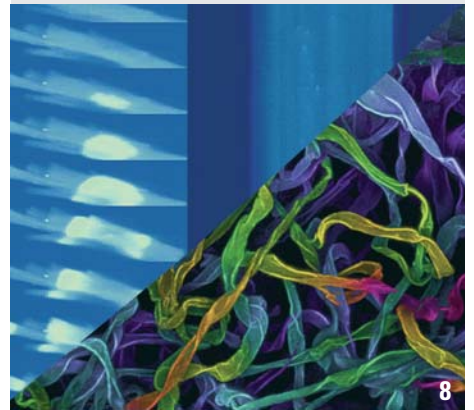
## The Fastest True Confocal

### **Full field high speed imaging**

The resonant scanner of the Leica TCS SP5 enables you to acquire high speed images at large formats (full field high speed imaging). A scanning frequency of 8 kHz allows for line-frequencies up to 16 kHz and corresponding data acquisition at a time resolution of better than 65  $\mu$ s. Unlike any other high-speed concept, the Leica TCS SP5 will allow you to cover a field of view of 15 mm diagonal even at high speed. Also, the full spectral tunability of SP-detection and AOBS® is maintained for resonant scanning. Any laser combination and any emission band can be employed – full field rotation and even panning in x and y is available.

### **True Confocal for highest resolution, low bleaching**

Using a resonant scanner for high speed scanning offers further advantages: the true confocal scanning system does not reduce optical sectioning performance, as do slit-scanners or spinning disc-systems. Plus, due to short illumination times, bleaching is reduced significantly as compared to parallel scanning.



- True single point Confocal Tandem Scanner (conventional and resonant)
- Frame rates up to 250 frames/s
- Line frequencies from 1Hz to 16 KHz
- Spot recording (beam park)
- Field rotation at all speeds
- Triggers and synchronization signals for integration in experiments



**“Science is all about wanting to know. It’s never about wanting to wait, is it?”**

#### **Dr. Jan Ellenberg**

Group Leader, Ellenberg Group  
Functional Dynamics of Nuclear Structure  
during the Cell Cycle  
EMBL  
Heidelberg, Germany

Imagine a confocal that makes your work much more flexible. A device that supports quick decisions in the lab as well as simultaneous data acquisition while at the same time providing the highest efficiency through better transmission of emitted light. Can't think of any? Well, Leica can. The new Leica TCS SP5. For those who want to reach higher.

#### Better images in less time

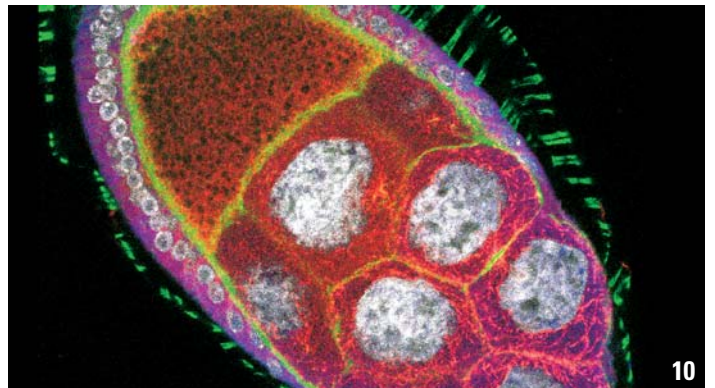
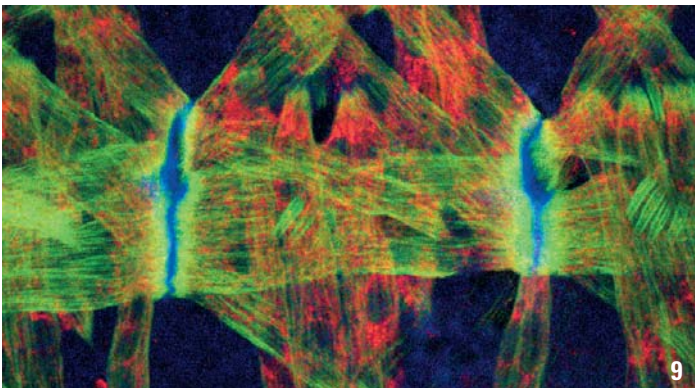
The new Leica TCS SP5 is composed of up to five true spectral channels, allowing simultaneous data acquisition at five individually tunable spectral bands. Spectral separation is performed by the patented Leica SP detection concept, employing a prism and mirror-sliders. This ensures maximal transmission of the detection module which in turn guarantees high efficiency. What does this mean for your work? Less photobleaching. And better images in less time.

## Leading in Multispectra

The Leica TCS SP5. Highest Sensitivity. Broadband

#### Ready when you are

Much better transmission for emitted light than with e.g. dichroic mirrors is provided by the acousto-optical beam splitter AOB<sup>S</sup>. In addition to this higher quality standard, the system offers the option of switching quickly between sequential scans and region-of-interest scans with entirely individual excitation schemes. And whenever you need to employ new dyes or laser lines, the AOB<sup>S</sup>, being a single optical tunable element, is immediately applicable. Or, as we say: it is ready when you are.



### A tool that tunes in on your quality needs

The Leica TCS SP5 provides you with unique sensitivity in confocal microscopy by combining three quickly tunable devices – AOTF (Acousto-Optical Tunable Filter), AOBS® and SP-Detector (Spectrophotometer Detector).

### Need more options? Here you go

Perform FLIM (Fluorescence Lifetime Imaging) data acquisition with the spectral detector and tune continuously the emission bands. This option enormously widens the application range of FLIM. Plus it permits the investigation of wavelength dependencies of fluorescence lifetime.

This high flexibility for multi-parameter fluorescence is also applied to a non-descanning detection module for four channels reflected light, and four channels transmitted light is available. It supplies

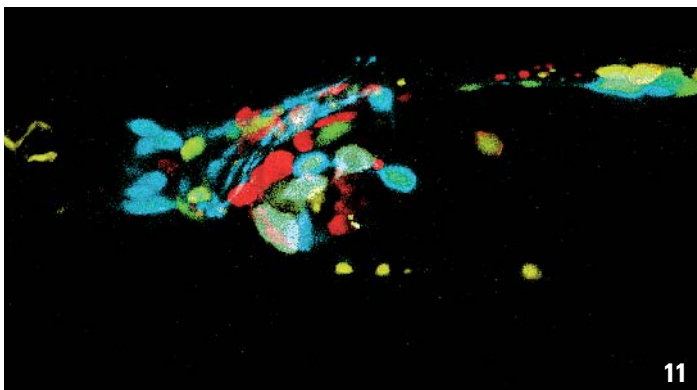
- Maximum transmission with prism-based Leica SP detector
- 5 spectral confocal channels (max)
- Extreme sensitivity with Leica AOBS®
- 8 non-descanned channels (max) \*
- Online ROI-spectrometer \*
- APD (Avalanche Photo Diode) detection for ultimate sensitivity \*
- Spectral FLIM, 2 channels
- Dual channel FCS \*
- Auxiliary emission port \*
- Very fast beam path configuration
- Most effective channel separation

\* optional

# Imaging

## Spectral Performance

wavelength separation by secondary beam splitters and barrier filters on motorized and computer controlled wheels. An emission port for individual purposes is used for fluorescence cross correlation spectroscopy, 2-channel FCS (Fluorescence Correlation Spectroscopy), or serves as an online ROI (Region Of Interest) spectrometer, enabling you to record and display emission spectra online. The combination of FCS via the emission port and spectral FLIM by internal SP detectors makes the instrument ready for both FCS and FLIM.

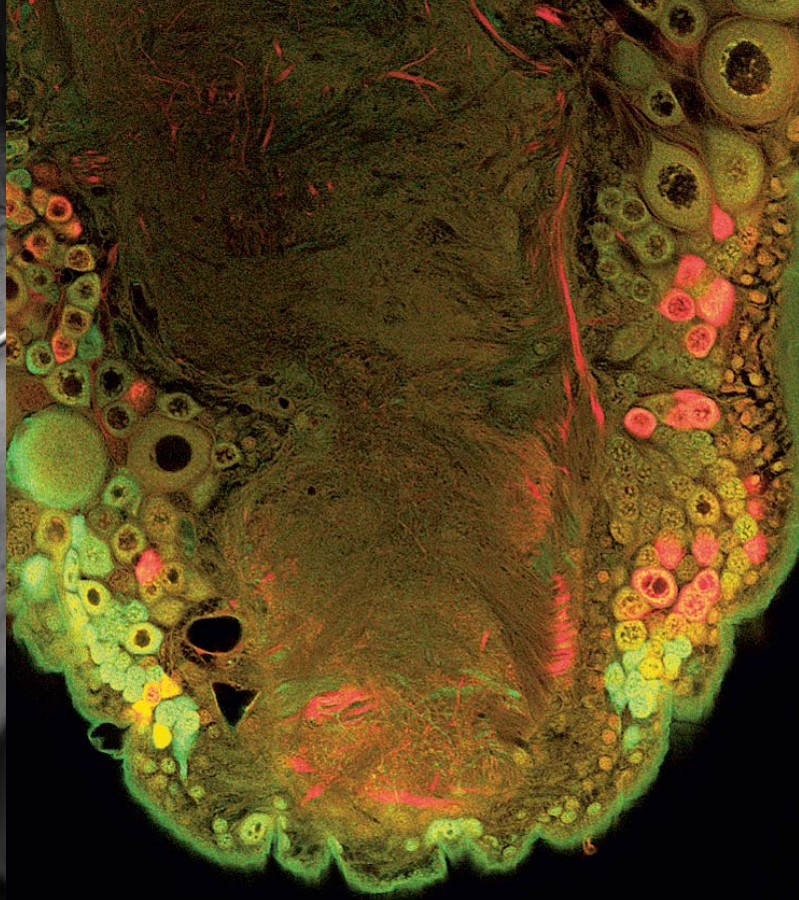


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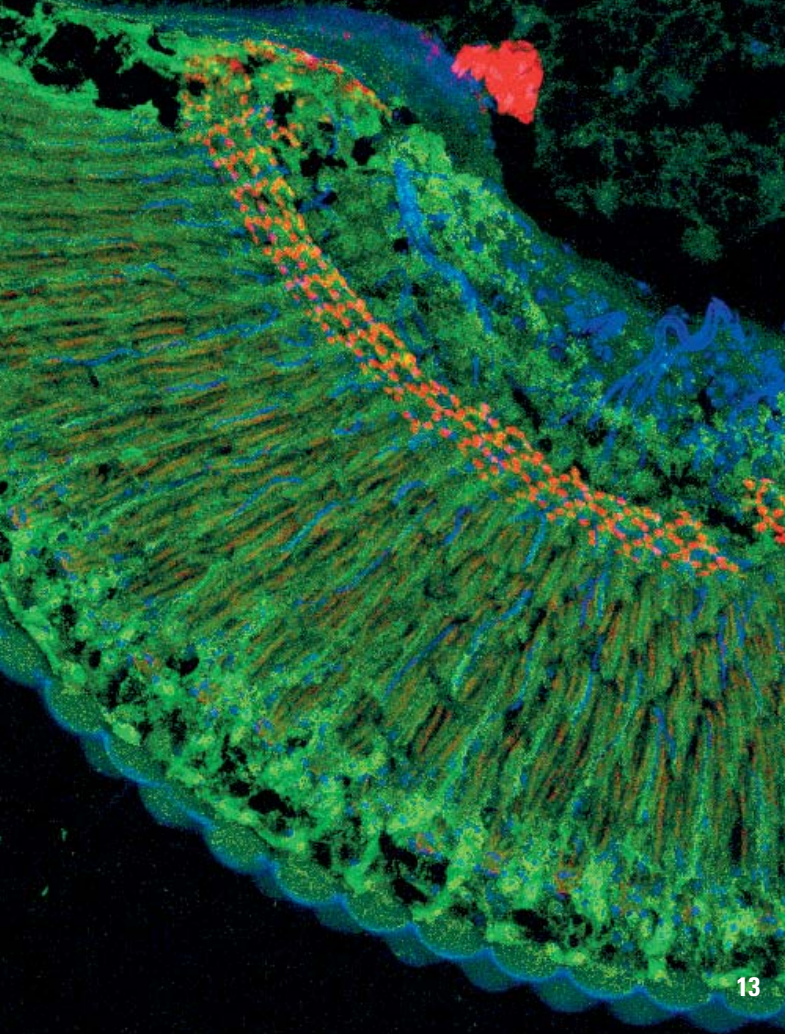


**“The Acousto Optical Beam Splitter has revolutionized confocal fluorescence microscopy. Maximum sensitivity and applicability of multiple light sources gives real advantages for our scientific work.”**

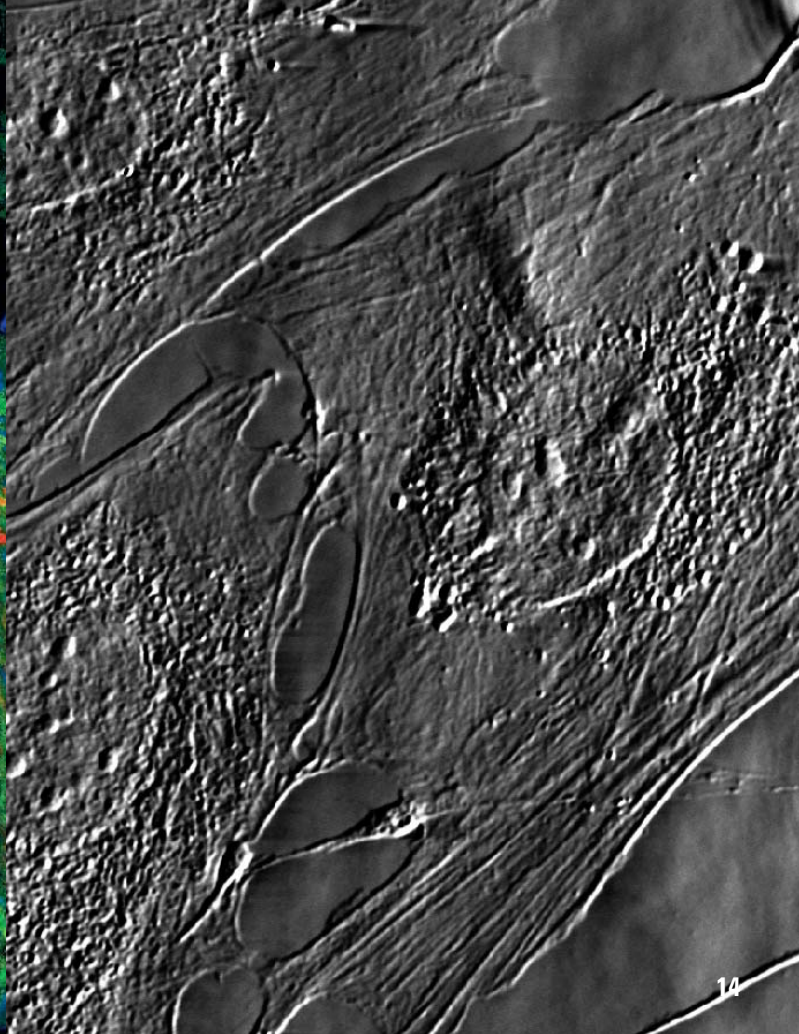
**Prof. Alberto Diaspro**  
Department of Physics  
University of Genoa  
Genoa, Italy



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**There are a lot of good tools out there. Think of all the things you could do, if you had access to all of them. The new Leica TCS SP5 takes you a big step closer to this dream. Because it takes further the most advanced technical concepts currently available. And unites them in one single system.**

#### **SuperZ stage**

Distortion-free recording of large 3D stacks and live vertical sectioning of the specimen is enabled by the new galvanometer-driven backlash-free focusing stage, moving parallel over a large 1.5 mm range – a precondition for perfect imaging results.

#### **From UV to IR within one single system**

Three different laser ports in just one system – this concept of multiplicity provides excitation from UV to IR. This means you can simultaneously work with UV dyes, visible dyes and multiphoton microscopy while covering excitation from 350 nm to 1050 nm. The range of spectral detection reaches from 400 nm to 800 nm.

#### **The big picture: a larger image field at your disposal**

The Leica TCS SP5 offers you an entirely new scanner concept for working with high frame rates, up to 250 fps, with full performance over the whole field of view (15 mm resonant, 22 mm conventional). And with frame sizes up to 8192 x 8192 pixels (64 Mpix), optical resolution in such a large field is easily transported – without losing time on cumbersome multi-frame mosaic procedures.

## Unique Options for High-Quality Results

Combining the Best Hardware in One System.

#### **The intelligent base**

Designed around our high specification automated Leica DM/DMI Digital Research Microscopes, performance and flexibility enable outstanding results. The unique range of CS objectives, tested and selected for confocal applications, turns the Leica TCS SP5 into a powerful solution – tailored to your research needs.

- Precise optical sectioning with SuperZ Galvo stage
- UV, VIS and IR in one system
- Excitation range 350–1050 nm
- 405 nm imaging
- D-FLIM 405 nm
- IR Laser
- Up to 64 Megapixels/image, field rotation 200°, also for resonant scan



#### **Leica TCS SP5 – Detection module**

Proven SP-detection by Leica for both standard imaging and 2-channel FLIM – that is what lies at the heart of our new confocal microscope. This innovative combination allows for true spectral FLIM data acquisition, taking you to an entirely new dimension of fluorescence imaging.

Additionally, fluorescence cross correlation spectroscopy (FCCS) can be performed with the same instrument: Leica TCS SP5.



### Step 1: Setup

Adjust software parameters for your setup and predefine imaging parameters for a new scan, ready for triggering the laser and other hardware.

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### Step 2: Bleach

Turn the laser power for bleaching (488nm) on for bleaching.

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### Step 3: Time course

Define the number of prebleaches, bleaches and postbleach scans.

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## FRAP Wizard

### Step 4: FRAP result

Evaluation of the fluorescence recovery. Offline Quantification possible.

**Step 4: FRAP result**

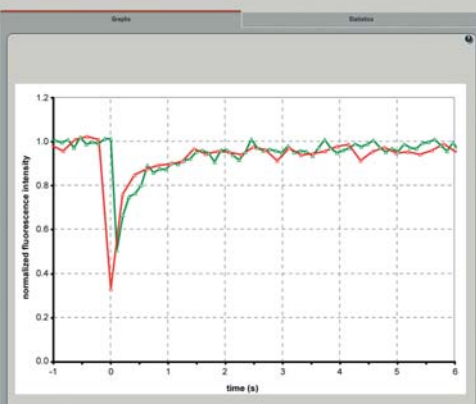
Evaluation of the fluorescence recovery. Offline Quantification possible.

Step 4: FRAP result

Evaluation of the fluorescence recovery. Offline Quantification possible.

Step 4: FRAP result

Evaluation of the fluorescence recovery. Offline Quantification possible.



**Time is precious. Of course you want to have answers to your scientific questions as quickly as possible. The new Leica TCS SP5 system comes with a user-friendly workflow based software package that lets you concentrate on what is worth your attention: research with high-quality results.**

#### **We are used to setting standards**

Leica pioneered user-guiding software in 1995 by introducing workflow arrows to guide the user step by step through the process of sensible data recording. Ever since, this concept has been refined and improved to constitute the main base for our new user interface: Leica LAS AF (Leica Application Suite Advanced Fluorescence).

#### **Standardized software for easy use and compatibility**

Leica LAS AF is the platform for all software in Leica Microsystems. This ensures compatibility of different applications with different hardware, covering the whole range of microscopy and imaging equipment from Leica Microsystems.

Since all Leica software is identically structured, once you are trained to use one of our applications, you will easily learn to operate completely unrelated applications – saving time and training effort.

## Intelligent and Intuitive Interface

### High Usability for High Ambitions.

The clearly structured user interface is designed for easy, ergonomic use. It takes you through all necessary steps, always showing current options while hiding currently irrelevant ones. You do not have to be an IT expert to configure your own tools. After all, we know that you need to concentrate on what is really important – your research results.

#### **Software that really works for you**

In addition to the basic applications, Leica offers you a whole range of extended applications. Software wizards for FRAP, FLIP (Fluorescence Loss In Photobleaching) and FRET (Fluorescence Resonance Energy Transfer) are designed to support your workflow and efficiency. The benefits are obvious: no need for configuring tools. You can fully concentrate on your work.

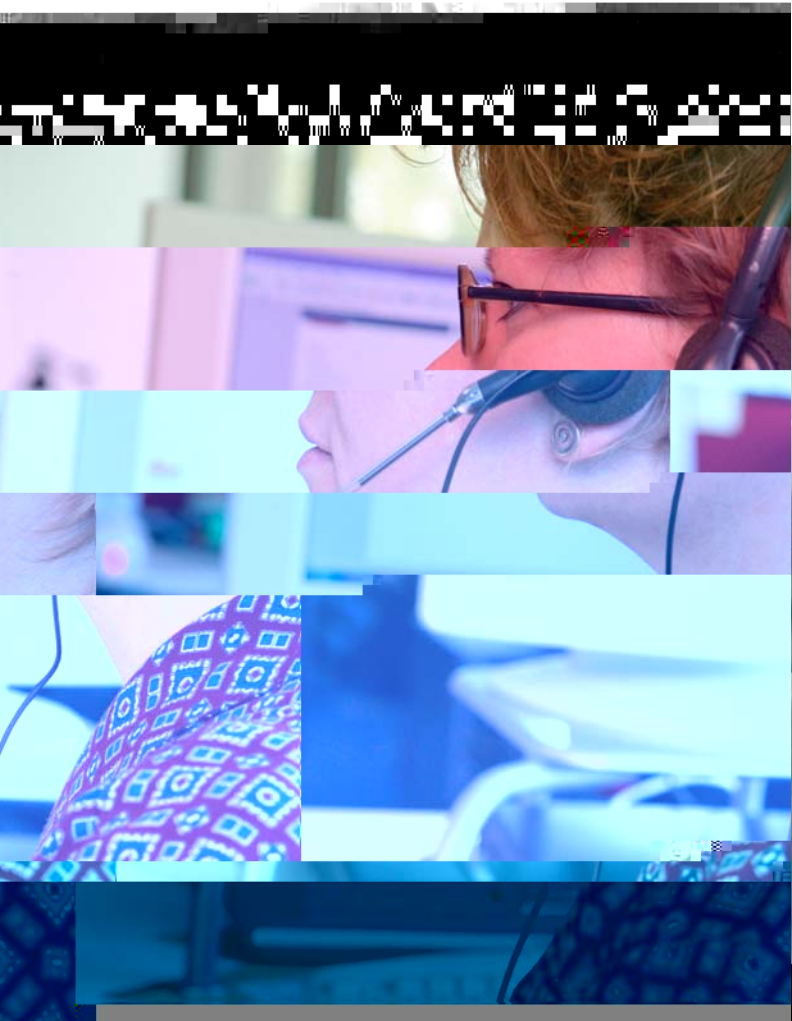
- Clear and non-distracting
- Guided workflow
- Interactive, fast set-up by programmable control panel
- Ergo-check of settings
- Advanced Time Lapse
- Live Data mode
- 3D reconstruction
- Colocalization analysis
- Dye Finder: linear unmixing
- FRAP wizard
- FRAP XT and FlyMode FRAP
- FRET Wizards
- FCS and FLIM applications



**“Enormous flexibility and significantly improved transparency are the benefits which we gain from the Leica SP detection module.”**

#### **Prof. Fujio Murakami**

Neuroscience Laboratories  
Developmental and Functional  
Neuroscience Group  
Graduate School of Frontier Bioscience  
Osaka University  
Osaka, Japan





## Acknowledgements:

We gratefully acknowledge the following scientists for providing images:

- 1** *Drosophila melanogaster* (eye section)  
Red: F-Actin, Cy3; Blue: Nuclei, DAPI; Green: pigmented cells, GFP  
Courtesy of Anne Galy, IGBMC, Strasbourg-IIIkirch, France
- 2 (13)** *Drosophila melanogaster* (eye section)  
Green: Retina cells, GFP; Red: F-Actin, Cy3; Blue: Nuclei, DAPI,  
Courtesy of Anne Galy, IGBMC, Strasbourg-IIIkirch, France
- 3, 10** *Drosophila melanogaster* (egg chamber)  
Green: Actin, Alexa 488-Phalloidin; Red: Cortex, Egalitarian Red  
Blue: hnRNP, Cy5; Grey: Nuclei, DAPI  
Courtesy Sonja Lopez de Quinto, Florence Besse & Oliver Hachet,  
EMBL, Heidelberg, Germany
- 4 (6)** *Cyprinus carpio* (retina)  
Green: Amacrine cells, FITC; Red: red and green cones, Cy3  
Courtesy of Dr. Konrad Schultz, Carl-von-Ossietzky University  
Oldenburg, Neurobiology, Oldenburg, Germany
- 5 (14)** Human fibroblasts  
Transmitted light  
Courtesy of Dr. Günter Giese,  
Max Planck Institute for Medical Research, Heidelberg, Germany
- 8** Upper left: Ca<sup>2+</sup> waves in muscle cells, time lapse recording.  
Courtesy of D. Eisner, University of Manchester, UK  
Lower right: Hairs on spring leaves, color-coded height projection  
Courtesy of R. Borlinghaus, Leica Microsystems
- 9** *Drosophila melanogaster* (state16 embryo)  
Green: F-Actin, TRITC-Phalloidin; Red: muscles, Myosin, Cy3  
Blue: Tigrin (Extracellular matrix protein), Cy5  
Courtesy of Dr. Laurent Soustelle and Dr. Angela Giangrande,  
IGBMC, Strasbourg-IIIkirch, France
- 11** *Caenorhabditis elegans* (neurons)  
Green: GABAergic neurons, GFP; Red: glutamatergic interneurons,  
DsRed; Cyan: sensory and interneurons, CFP; Yellow: excitatory  
motoneurons, sensory neurons, YFP; Grey: sensory neurons, DiD  
Courtesy of Dr. Harald Hutter, Max Planck Institute for Medical  
Research, Heidelberg, Germany
- 7** *Arabidopsis thaliana* (leave)  
Green: Endoplasmatic Reticulum, GFP; Red: Plastides, auto-  
fluorescence; Grey: DIC (Differential Interference Contrast)  
Courtesy of Prof. Dr. Diedrik Menzel, Institute for Cellular and  
Molecular Botany (IZMB), Rheinische Friedrich-Wilhelms-  
University, Bonn, Germany
- 12** *Schistocera gregaria* (nervous system)  
Green: cell bodies and GABA containing axons, Cy2  
Red: cell bodies and cns axons, Cy3  
Leica Microsystems CMS, Mannheim, Germany

## Leica TCS SP5 – Multiphoton/Confocal System





[www.leica-microsystems.com/sp5](http://www.leica-microsystems.com/sp5)

Achtung das ist ein Einklapper  
70 mm, nach linkseingeklappt



# Leica Microsystems – the brand for outstanding products

Leica Microsystems' mission is to be the world's first-choice provider of innovative solutions to our customers' needs for vision, measurement and analysis of microstructures.

Leica, the leading brand for microscopes and scientific instruments, developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Yet Leica symbolizes innovation as well as tradition.

## Leica Microsystems – an international company with a strong network of customer services

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Denmark:	Herlev	Tel. +45 4454 0101	Fax +45 4454 0111
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Germany:	Bensheim	Tel. +49 6251 136 0	Fax +49 6251 136 155
Italy:	Milan	Tel. +39 0257 486.1	Fax +39 0257 40 3475
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Korea:	Seoul	Tel. +82 2 514 65 43	Fax +82 2 514 65 48
Netherlands:	Rijswijk	Tel. +31 70 4132 100	Fax +31 70 4132 109
People's Rep. of China:	Hong Kong	Tel. +852 2564 6699	Fax +852 2564 4163
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Switzerland:	Glattbrugg	Tel. +41 1 809 34 34	Fax +41 1 809 34 44
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USA:	Bannockburn/Illinois	Tel. +1 847 405 0123	Fax +1 847 405 0164

and representatives of Leica Microsystems  
in more than 100 countries.

The companies of the Leica Microsystems Group operate internationally in three business segments, where we rank with the market leaders.

### ● Microscopy Systems

Our expertise in microscopy is the basis for all our solutions for visualization, measurement and analysis of microstructures in life sciences and industry. With confocal laser technology and image analysis systems, we provide three-dimensional viewing facilities and offer new solutions for cytogenetics, pathology and materials sciences.

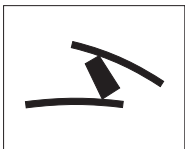
### ● Specimen Preparation

We provide comprehensive systems and services for clinical histo- and cytopathology applications, biomedical research and industrial quality assurance. Our product range includes instruments, systems and consumables for tissue infiltration and embedding, microtomes and cryostats as well as automated stainers and coverslippers.

### ● Medical Equipment

Innovative technologies in our surgical microscopes offer new therapeutic approaches in microsurgery.

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Innovationspreis  
der deutschen Wirtschaft  
The World's First Innovation Award

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