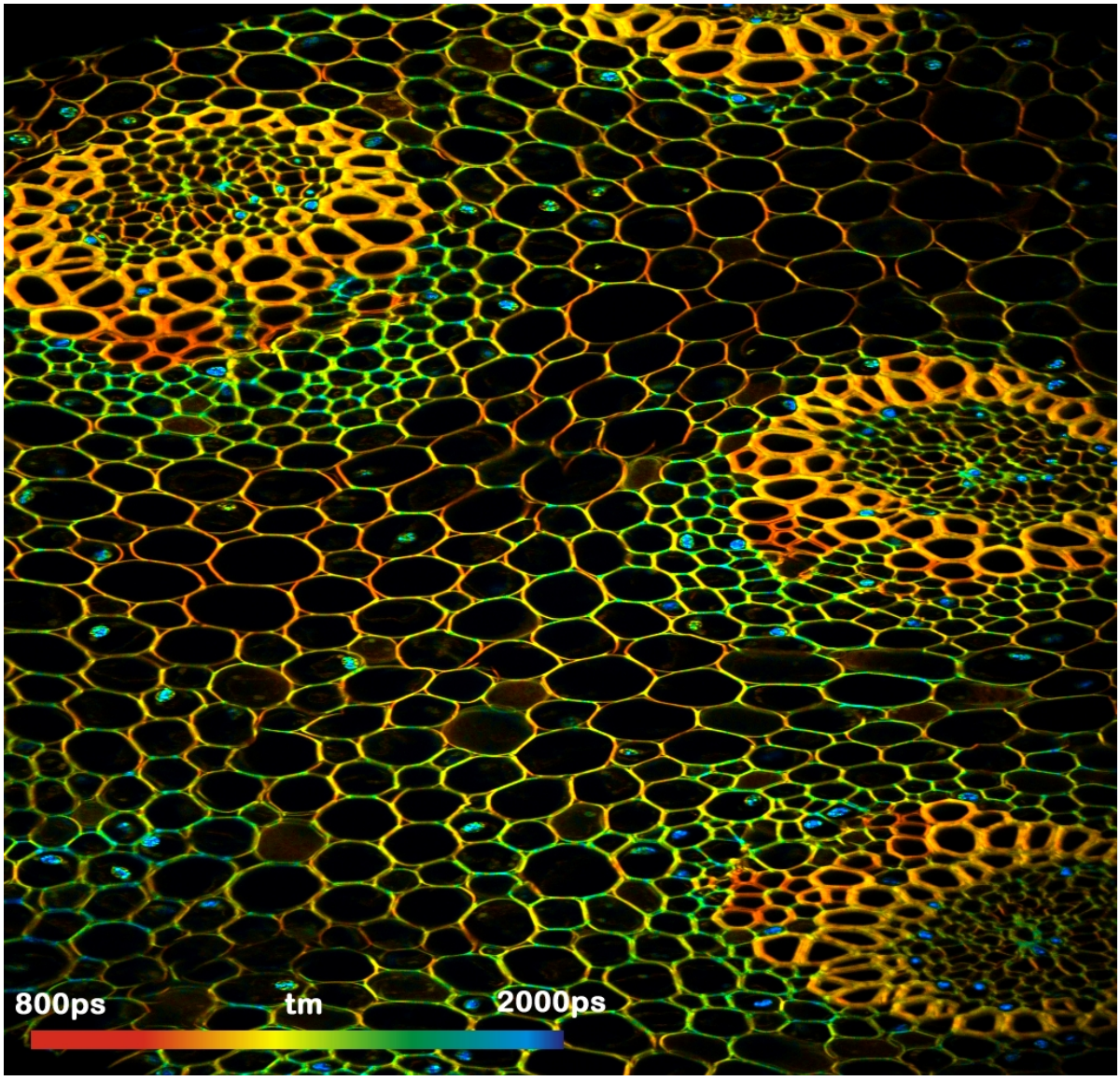
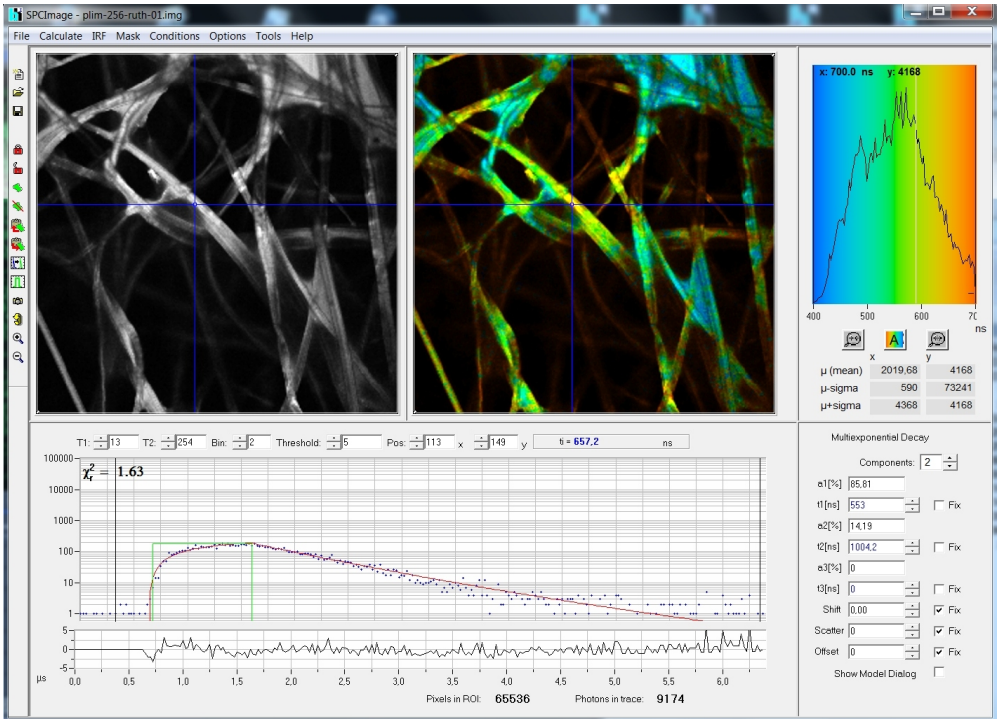
DCS-120 MP System Records Multiphoton FLIM and PLIM

The DCS-120 MP is an extended version of the bh DCS-120 confocal scanning FLIM System. It uses multiphoton excitation by a femtosecond titanium-sapphire laser, fast galvanometer scanning, non-descanned detection, hybrid detector technology, and single-photon recording by bh's multi-dimensional TCSPC process. An AOM is included to control the laser power and to modulate the laser for PLIM acquisition. The system records FLIM data in two fully parallel recording channels, runs Z stacks, accumulates fast FLIM time series, and records simultaneously FLIM and PLIM. All components, including the laser and the AOM, are controlled by bh's SPCM 64 bit data acquisition software. By using bh's 64 bit Megapixel FLIM technology, images of the full field of view of the microscope can be recorded at diffraction-limited resolution. Image formats as large as 2048 x 2048 pixels with 256 time channels per pixel are available.

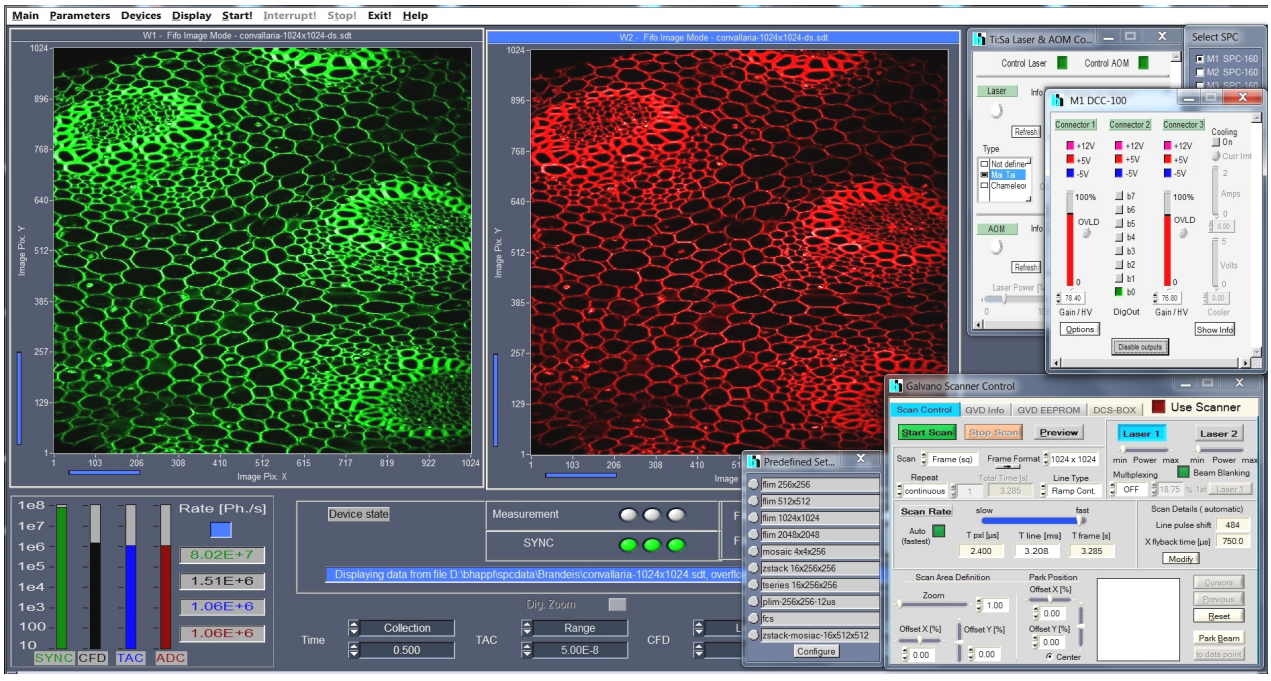


Convallaria sample with 1024 x 1024 pixels, 256 time channel per pixel. DCS-120 scan head, Nikon Eclipse inverted microscope, Spectra Physics Mai Tai laser. Microscope lens 20x NA = 0.5. Excitation wavelength 800 nm

Due to its fast scan rates and its high sensitivity, the DCS-120 MP is compatible with live cell and life tissue imaging. Typical applications are measurements of local molecular environment parameters, protein interaction experiments by FRET, imaging of metabolic parameters derived from the fluorescence decay functions of endogenous fluorophores, and correlated metabolic and oxygen saturation imaging.



Phosphorescence Lifetime Image, recorded by bh's PLIM technique based on laser modulation and dual-time-base recording. SPCImage FLIM / PLIM data analysis.



Main Panel of SPCM Software. Images in two spectral channels, control panels for scanner, laser and AOM, detectors, and predefined setup panel for easy selection of imaging mode.

Key Specifications

Excitation	Femtosecond Titanium:Sapphire Laser			
Wavelength	Typ. 750 to 980 nm, depends on laser			
Excitation pulse frequency	75 to 80 MHz, depends on laser			
Coupling into scan head	Free beam			
Power control	Acousto-optical modulator (AOM). AOM is optional for FLIM but required for 2p PLIM. AOM can be retrofitted.			
Laser modulation for PLIM	Acousto-optical modulator (AOM).			
AOM response time	200 ns in PLIM mode			
Laser and AOM control	via SPCM TCSPC/FLIM data acquisition software			
Additional excitation sources	ps diode lasers, supercontinuum laser with AOTF. Optional, can be retrofitted to the system.			
Microscopes	All inverted microscopes of Zeiss, Nikon, and Olympus			
Detection beam path	Non-descanned (direct) detection for 2p excitation Optional transmission path for SHG recording 2 confocal detection channels for 1p excitation Piezo actuators for confocal alignment			
Detectors	Two HPM-100-40 GaAsP hybrid detectors. No afterpulsing background, no secondary pulses in IRF Option: HPM-100-50 GaAs hybrid detectors Option: MW-FLIM GaAsP 16-wavelength detector			
Detector protection	Electronic overload shutdown			
Detection wavelength selection	Beamsplitter / filter cube in front of detectors			
Scanner	bh DCS-120 scan head			
Alignment	via internal piezo actuators			
Scanner control	integrated in SPCM TCSPC/FLIM data acquisition software			
Scan format, pixels	2048 x 2048	1024 x 1024	512 x 512	256 x 256
Scan format, time channels (max)	256	1024	4096	4096
Scan rate, frames per sec., at zoom 4	0.37	0.65	1.47	2.95
Scan rate, lines per sec., at zoom 4	500	750	750	750
Additional scanner ports	Additional port for visible-wavelength laser Two outputs for additional confocal detectors			
TCSPC System	Two parallel SPC-150, SPC-150N or SPC-160 channels Upgrade to three or four parallel channels possible			
FLIM modes	X-Y scan, fast intensity preview mode, fast lifetime preview mode, Z Stack by record-and-save procedure, Z Stack by Mosaic FLIM function, time series FLIM by record-and-save procedure, time series FLIM by Mosaic FLIM function, fast accumulated Mosaic FLIM time series, fast accumulated line scan time series (FLITS), PLIM, simultaneous FLIM and PLIM			
FCS mode	Online FCS, by correlating photon macro times, spot selected by beam park function of scanner			
Selection of operation mode	Via predefined-setup panel			
FLIM data analysis	By bh SPCImage data analysis software. 1-2-3 exponential fit, incomplete-decay model, 1st. moment analysis. No IRF recording necessary. Images of lifetime components, amplitudes of components, intensity and amplitude-weighted lifetime, relative intensity contribution, FRET efficiency. 1D histograms in region of interest, 2D histograms of decay parameters, phasor plot.			

For details, please see Handbook of DCS-120 Confocal Scanning FLIM System, 6th ed. or later or bh TCSPC Handbook, 6th ed. or later, both available for free download at www.becker-hickl.com. Printed copies available from bh.