

# Simple-Tau 130 Table-Top TCSPC Systems

Ultra-fast time-correlated single photon counting systems in laptop format

Based on bh SPC-130 TCSPC module

Compact TCSPC system

Laptop computer with extension box

Coupled via fast bus extension interface

SPC-130 TCSPC module, detector, detector controller

Picosecond resolution

Time channel width down to 813 fs

Electronic IRF 7 ps FWHM

High count rate

Unprecedented timing stability

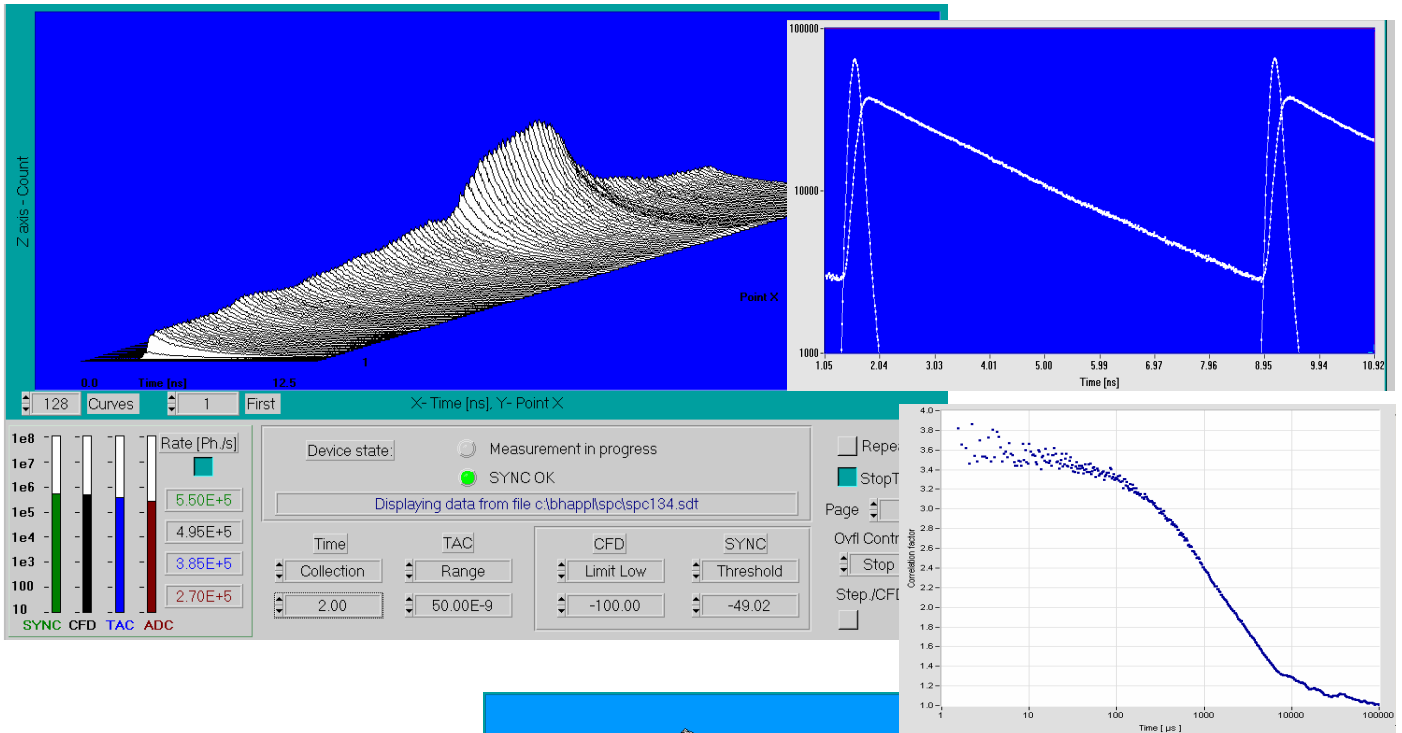
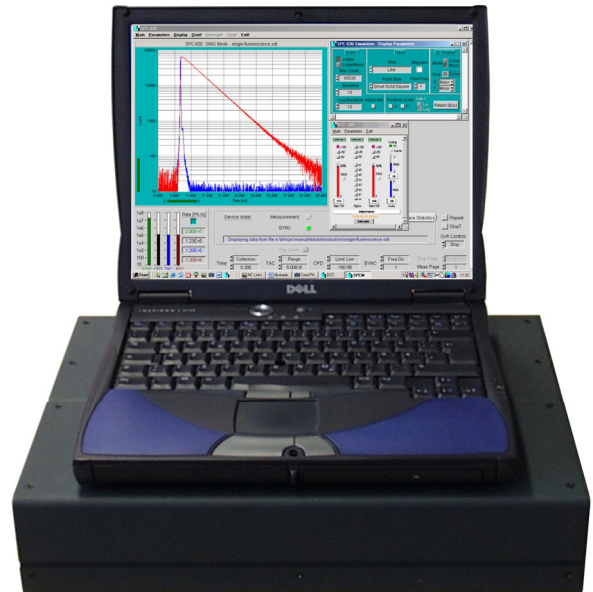
Photon distribution and time-tag modes

Standard fluorescence decay recording

Fast triggered sequential recording

FCS recording

Works under windows 2000, NT, XP, Vista



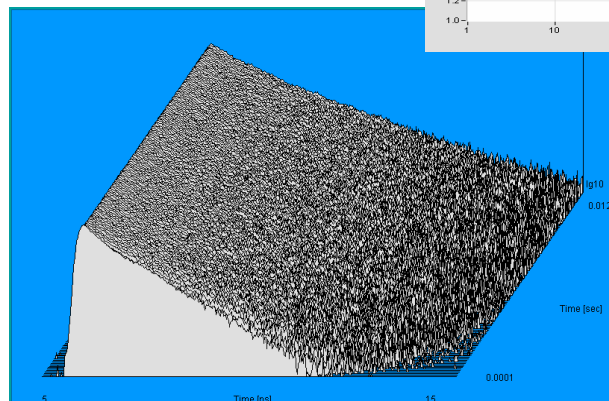
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Covered by patents DE 43 39 784 and DE 43 39 787

# Simple-Tau 130 Table-Top TCSPC Systems

## Photon Channel

Principle	Constant Fraction Discriminator (CFD)
Time Resolution (FWHM / RMS, electr.)	8 ps / 5 ps
Opt. Input Voltage Range	- 50 mV to - 1 V
Min. Input Pulse Width	400 ps
Threshold	- 20 mV to - 500 mV
Zero Cross Adjust	- 100 mV to + 100 mV

## Synchronisation Channel

Principle	Constant Fraction Discriminator (CFD)
Opt. Input Voltage Range	- 50 mV to - 1 V
Min. Input Pulse Width	400 ps
Threshold	- 20 mV to -500 mV
Frequency Range	0 to 200 MHz
Frequency Divider	1-2-4
Zero Cross Adjust	-100 mV to + 100 mV

## Time-to-Amplitude Converters / ADCs

Principle	Ramp Generator / Biased Amplifier
TAC Range	50 ns to 2 us
Biased Amplifier Gain	1 to 15
Biased Amplifier Offset	0 to 100% of TAC Range
Time Range incl. Biased Amplifier	3.3 ns to 2 us
min. Time / Channel	813 fs
ADC Principle	50 ns Flash ADC with Error Correction
Diff. Nonlinearity	< 0.5% rms, typ. <1% peak-peak

## Data Acquisition (Histogram Mode)

Method	on-board multi-dimensional histogramming process
Dead Time	100ns, independent of computer speed
Saturated Count Rate, per TCSPC channel / total	10 MHz
Useful count rate, per TCSPC channel / total	5 MHz
max. Number of Curves in Memory	4096      1024      256      64
Number of Time Channels / Curve	64      256      1024      4096
max. Counts / Time Channel	$2^{16}-1$
Overflow Control	none / stop / repeat and correct
Collection Time	0.1 us to 10000 s
Display Interval Time	100ms to 1000 s
Repeat Time	0.1 us to 1000 s
Sequential recording	Programmable Hardware Sequencer
Synchronisation with scanning	pixel, line and frame clocks from scanning microscope
Count Enable Control	1 bit TTL
Experiment Trigger	TTL

## Data Acquisition (FIFO / Time-Tag Mode)

Method	Time-tagging of individual photons and continuous writing to disk
Dead Time	100 ns
Output Data Format (ADC / Macrotime / Routing)	12 / 12 / 3
FIFO buffer Capacity (photons)	128 k
Macro Timer Resolution, internal clock	50ns
Macro Timer Resolution, clock from SYNC input	10ns to 100ns
Curve Control (external Routing)	3 bit TTL
Count Enable Control	1 bit TTL
Waveform recording	online from time-tag data, up to 16 detector channels
No of counts per time channel	unlimited
FCS calculation	Multi-tau algorithm, online calculation and online fit

## Detector control

Number of independently controlled detectors	one or two
Resolution of gain control	12 bit
Voltage Range Pin 12 of connector 1 and 3	0 to +10 V
Voltage Range Pin 13 of connector 1 and 3	0 to +0.9 V
Output Time Constant	100 ms
Detector overload shutdown	via TTL signal from PMC-100 detector module or preamplifier
Reset of overload shutdown	By Software and at Power-ON
Shutter control	8 independent high-current switches
Max. Switch Current, Single Switch	2 A
Max. Switch Current, Sum of all Switches	5 A
Max. turn-off Voltage at Switches	20 V
Control of thermoelectric coolers	for one or two detectors
Total output voltage	0 to 5 V
Output Current	0 to 2 A
Resolution of Output Voltage and Current	12 bit

## Detectors, see individual data sheets

Standard detector	PMC-100-1 cooled PMT module
Optional	PMC-100-20 cooled NIR PMT module
Optional	HPM-100-40 and -50 GaAsP and GaAs hybrid detectors
Optional	R3809U MCP PMT HVM-100 power supply module and HFA26-01 preamplifier
Optional	id100-20 and id100-50 single-photon APD modules

## Related Products

SPC-130 through SPC-830 TCSPC boards, Simple-Tau 150, 152, 154 systems, FLIM systems, MCPs, PMT modules, SPAD modules, multi-spectral detector assemblies, routing devices for multichannel TCSPC, preamplifiers, PIN and avalanche photodiode modules, ps diode lasers.

## Related Literature

W. Becker, Advanced time-correlated single photon counting techniques. Springer 2005. Please contact bh for availability.  
 W. Becker, The bh TCSPC Handbook, 3rd edition. 466 pages, 503 references. Available on [www.becker-hickl.com](http://www.becker-hickl.com)  
 PML-16-C 16 channel detector head for time-correlated single photon counting. User handbook. Available on [www.becker-hickl.com](http://www.becker-hickl.com)  
 DCS-120 Confocal Scanning FLIM Systems, handbook. Available on [www.becker-hickl.com](http://www.becker-hickl.com)  
 Modular FLIM systems for Zeiss LSM 510 and LSM 710 laser scanning microscopes, handbook. Available on [www.becker-hickl.com](http://www.becker-hickl.com)  
 BDL-375-SMC, BDL-405-SPC, BDL-440-SMC, BDL-473-SMC NUV and blue picosecond diode lasers, handbook. Available on [www.becker-hickl.com](http://www.becker-hickl.com)  
 Please see also [www.becker-hickl.com](http://www.becker-hickl.com), 'Literature', 'Application notes'



More than 15 years experience in multi-dimensional TCSPC. More than 1300 TCSPC systems worldwide.