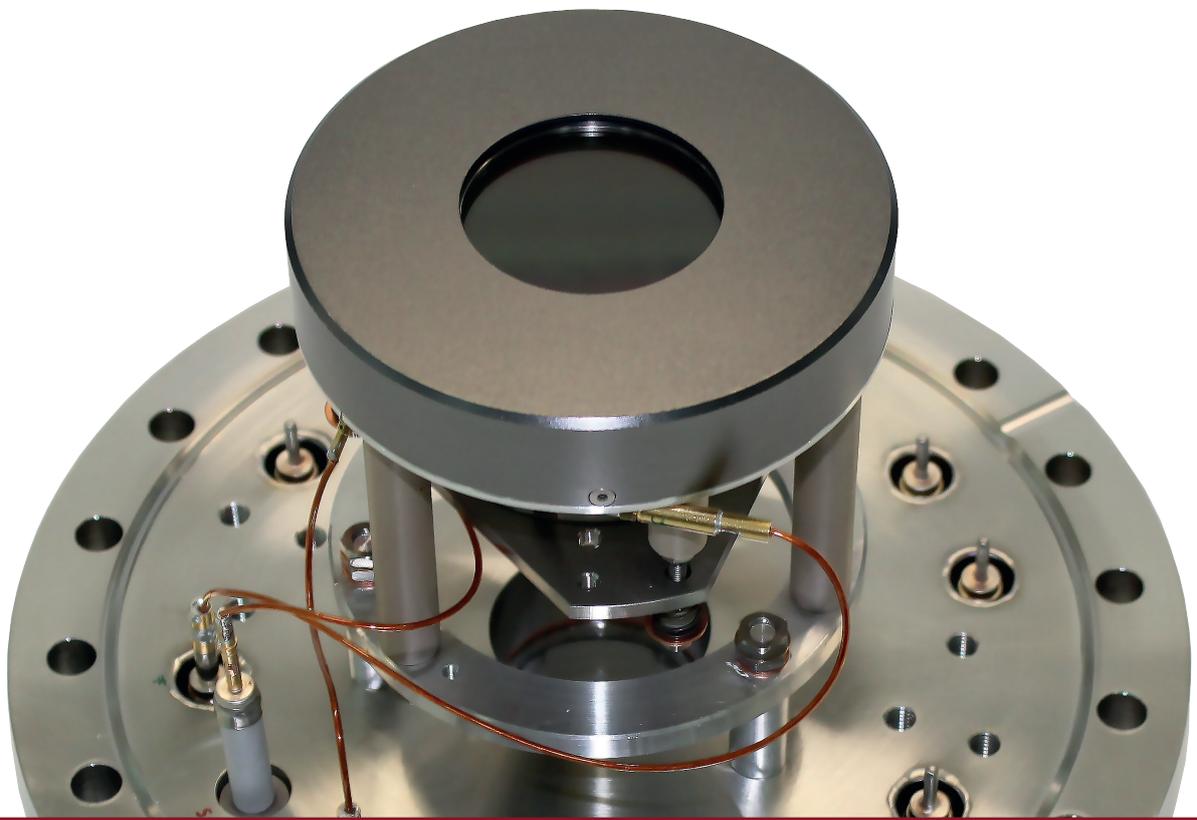


# Microchannel-Plate Detectors

Imaging and Counting Detection of  
Electrons, Ions and Photons

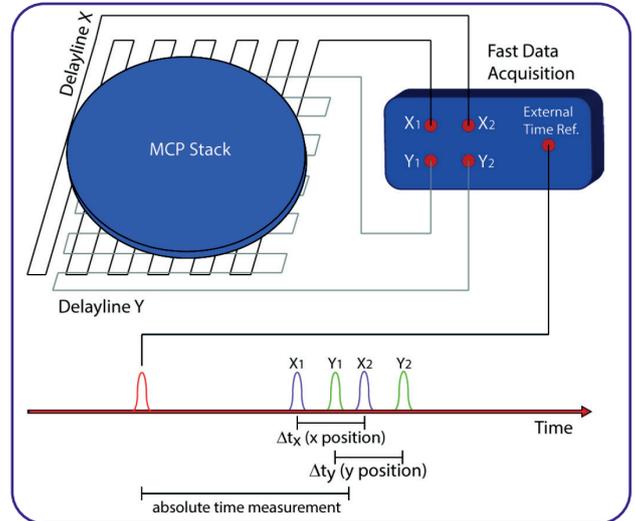


# Delayline Detector Systems

## - Imaging Detectors with Time Resolution -

Boost your particle analysis to a new level of high speed measurement. Delayline Detectors are superior particle imaging devices with excellent temporal resolution, very fast sampling (up to several 10MHz), and 1D/2D/3D histogramming on the fly.

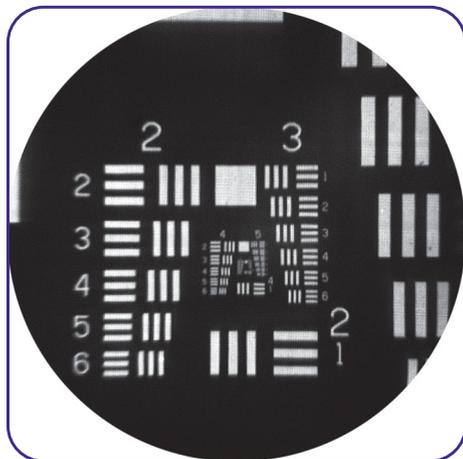
Surface Concept Delayline Detectors are the best choice when it comes to true counting with excellent signal-to-noise ratio in imaging applications with the highest time resolution in combination with permanent, dead time free data streaming.



Operation principle of a DLD. Charge cloud coupling from an MCP stack into an anode structure delayline arrangement enables the measurement of impact position and time by determining the arrival times of the pulses at the ends of the delaylines.



Delayline Detector 3D-DLD4040-150



Imaging of a UV-irradiated USAF 1951 type mask with a 40mm DLD

## Key Features

Active Diameters	10mm - 120mm
Lateral Resolution	down to 50 $\mu$ m
Imaging Countrate (Permanent Random)	> 5 million counts/s
Imaging Countrate (Special Layouts)	> 20 million counts/s
Max. Burst Rate	up to 100 million counts/s equivalent
Multi-Hit Designs	$\geq$ 4 hits
Time Bin Resolution	6.8ps
Typical Time Resolution (Position Integrated)	< 85ps (RMS)
Start Repetition Rate	max. 9MHz
Standard Coms	USB 3.0 & Gbit LAN

# Accompanying Readout Electronics - From Analogue to Digital -

We provide a large range of analogue and digital pulse processing electronics for a proper detection of the pulses from our MCP based detector systems either as stand-alone single components or as our modular laboratory control and acquisition system (Lab-IO). We pre-amplifiers, constant-fraction-discriminators (CFD), level converters, counter modules, time-to-digital converters (TDC) and high voltage power supplies. All necessary electronic components for a complete operation and readout chain from the detector into the PC.



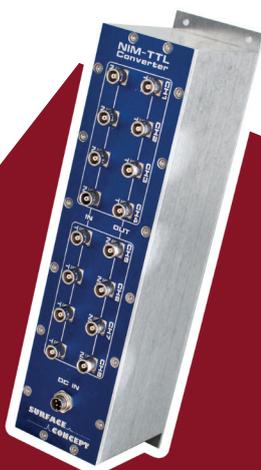
Stand-alone 4-channel counter module with coincidence measurement module



19" Lab-IO crate system available in 42TE and 84TE



Stand-alone 16-channel TDC SC-TDC-1000/165 with extended I/Os for advanced measurement applications



8-channel pulse level converter NIM to LVTTTL



1-channel pre-amplifier with CFD

# YAG Screen based Detector Systems - For Pure Imaging Applications -

Microchannel-Plate (MCP) based detectors with a single YAG crystal screen for **smallest decay times** for position resolved detection of electrons, ions and photons with **micrometer spatial resolution**.

Surface Concept ReconFlex™ cameras are unique, very fast, feature rich and multi-configurable CMOS cameras for fast synchronization with a **patented blob finder algorithm** for fast peak coordinate counting.

In combination with our YAG screen based detector systems the blob finder algorithm enables precise and **fast finding of peak coordinates** and **counting** with a frame rate of up to 1577 fps.



MCP based Detector with single YAG crystal screen with 40mm active area on a customer specific CF160 flange, prepared for ion spectroscopy applications

## Key Features

Active Diameters	40mm
Screen Material	YAG:CE
Screen Decay Time	70ns
Screen max. Emission Wavelength	550nm
Flange Sizes	CF100 & CF160



CMOS camera ReconFlex™ 800

## Key Features

ReconFlex™ Camera Type	1920 / 800
Image Sensor Type	CMOS (2/3)" / CMOS (1/1.7)"
Pixel Numbers	1920 x 1440 / 800 x 624
Typical Sensor Noise	< 3e <sup>-</sup> / < 6e <sup>-</sup>
Sensor Readout Dynamics	8bit & 12bit
Frame Rate @Full-Frame	up to 417fps (8bit) / 1577fps (8bit)
Data Interfaces	USB 3.0 & Gbit LAN

# Metal Anode based Detector Systems - Counting Applications with Time Resolution -



40mm active area MCP detector with metal anode

Microchannel-Plate based detectors with a single metal anode for the detection of electrons, ions and photons.

The cost-efficient solution for true event counting and time resolved measurements with an excellent signal-to-noise ratio.

Also available with segmented anodes (e.g. four quadrant segmentation) for a multi-hit detection by a parallelised and independent readout as well as customer specific design layouts.

MCP detectors are available with different active areas and are mounted on standard CF flanges with feedthroughs for signal transfer and HV supply.

Readout Electronics, TDCs and HV Power Supply solutions available from the large range of the Surface Concept product folio and available as complete detector package, taken into operation and adjusted for the best possible performance.



18mm active area MCP detector with metal anode in a customer specific design

## Key Features

Active Diameters	18mm - 80mm
Count rate* (Permanent Random)	> 5 million counts/s
Multi-Hit/ Segmented Designs	Available
Typical Time Resolution*	< 85ps (RMS)

\*depending on the actual used readout electronics. Given specification values achievable with Surface Concept Preamplifier-CFD and TDC solutions.

# Applications

- Time-of-Flight Analysis of Electrons and Ions (ToF)
- Time Correlated or Coincidence Photon and Particle Imaging
- Gated Imaging for X-Ray and Electron Spectroscopy
- True Counting Imaging with large Areas up to 120mm Detection Size
- Electron Energy and Time-of-Flight Analyzers (XPS, UPS, EELS)
- Time-of-Flight Photoemission Electron Microscopy (ToF PEEM)
- Medium Energy Ion Scattering with Time-of-Flight Analysis (MEIS ToF)
- Atom Probe Tomography / Microscopy (APT, 3D-AP)
- X-Ray Absorption / Emission Spectroscopy (XAS, XES)
- X-Ray Picosecond Imaging by Means of Time Gating for Contrast Enhancement
- Fluorescence Lifetime Imaging (FLIM, FLIM-FRET)



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**SURFACE** .....  
..... **CONCEPT**

# Channeltron Detectors

## - Cost-Efficient Counting Applications -



CEM4230 Detector

Our flange mounted channeltron electron multiplier (CEM) setups are the **cost-efficient** solutions for pure counting applications of electrons, ions and photons with **highest count rates** and an excellent signal-to-noise ratio. **Out-of-vacuum pulse decoupling** and voltage monitoring can be realised using our **Pulse Decouple Box**.

### Key Features

CEM Type	Photonis 4230 Megaspiraltron™ (further CEM types like Dr. Sjuts KBL series on request)
Open Diameter of CEM (nom.)	13.43mm
Base Flange Size	CF40
Feedthrough	3 x SHV5
Floating Possibility of CEM Front	+/- 1,000V

In addition we provide a large range of **analogue and digital pulse processing** electronics for a proper detection of the CEM pulses like pre-amplifiers, constant-fraction-discriminators (CFD) and counter modules as well as high voltage power supplies.

### Key Features

Voltage Input	2x SHV5 Sockets
Voltage Monitor	2x Monitor Output Sockets for Manual Control of applied High Voltage
Voltage Divider	Integrated Voltage Divider for Voltage Supply of CEM back side and CEM Anode
Pulse Decoupling	Pulse Decoupling from HV Supply Line with 500hm terminated Signal Line
Signal Output	BNC Connector



Pulse Decouple Box