

# HiCAM Fluo

Cooled High-Speed Fluorescence Camera

*Lambert* 

## HiCAM Fluo

The HiCAM Fluo is a versatile streaming camera system designed for fluorescence microscopy. It features a 1.3 megapixel image sensor that captures detailed images at high frame rates. Thanks to the integrated fiber-coupled image intensifier, it operates under low-light conditions, making it the ideal camera for high-speed fluorescence microscopy. Cooling of the intensifier significantly reduces the amount of noise.

With its gated image intensifier, the camera's effective exposure time can be reduced. The minimum gate width of 40 ns increases the range of light levels at which the camera can be used. It also eliminates motion blur and enables time-resolved filtering.

The fanless design of the camera minimizes vibrations to ensure sharp images. Very low noise levels are achieved by Peltier cooling the image intensifier. Noise levels are reduced by a factor of up to 100 times as compared to uncooled intensified cameras.

Images are streamed to a computer using a CoaXPRESS interface. This high-speed interface enables recording times limited only by hard disk space. Linking the camera to a framegrabber with on-board FPGA enables realtime analysis of the streamed data.

## Key Features

**Easy coupling:** Flexible and efficient lens coupling to all major-brand microscopes with C-mount or F-mount camera ports.

**High-resolution image intensifiers:** Gen III image intensifiers for the highest resolution and sensitivity in the UV, visible or NIR.

**Short gate pulse widths:** Down to 40 ns (FWHM) with minimal jitter.

**High gate repetition rates:** Up to 100 kHz

**Compact design:** For an easy fit to your imaging or microscopy setup.

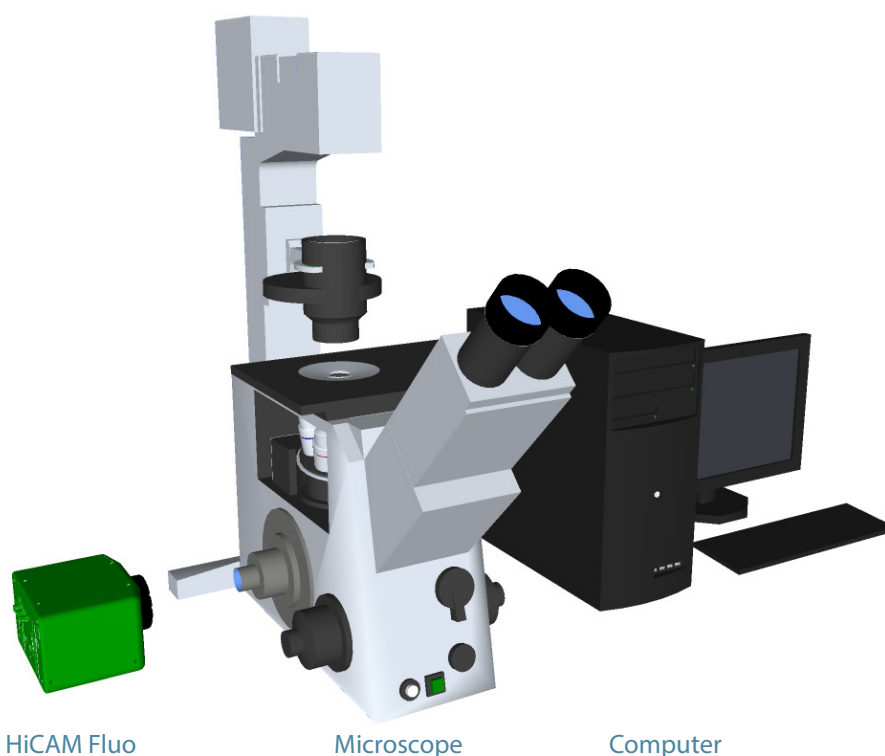
## Applications

High-speed Fluorescence Imaging  
Bio- and Chemiluminescence Imaging  
Time-resolved imaging and spectroscopy  
Laser Induced Fluorescence (LIF)  
Particle Image Velocimetry (PIV)  
Plasma physics  
Microfluidics  
Combustion



# CAMERA SPECIFICATION

Maximum resolution (pixels)	1280 x 1024		
Resolution (pixels)	1280 x 1024	1200 x 720	640 x 480
Frame rate (fps)	1000	1500	4000
Minimum exposure time	2 $\mu$ s		
Pixel size	6.6 x 6.6 $\mu$ m		
Computer interface	CoaXPress		
SDK and LabView driver	Optional		



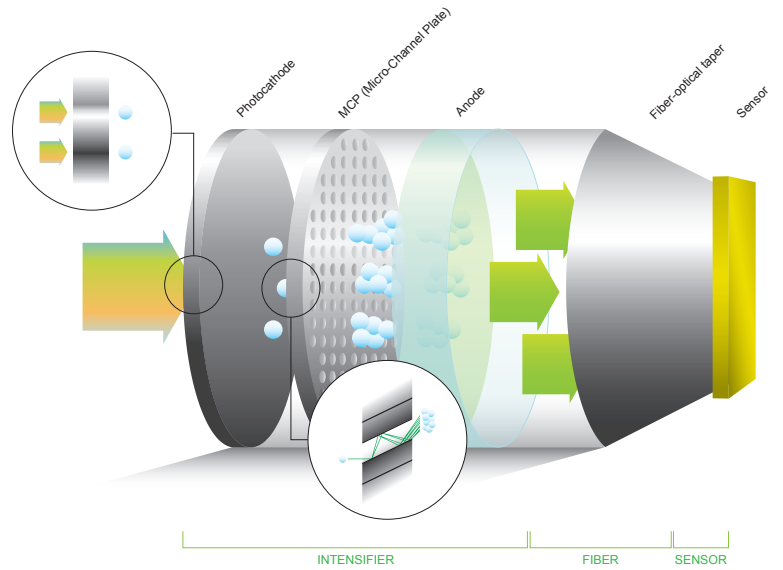
# GATING PROPERTIES

Gain Control	✓	
Gate control	✓	
Anode current limiter	✓	
Internal trigger generator	✓	
Shutter control	✓	Optional
Gating pulse width range	40 ns – 10 s	< 3 ns – 10 s
Minimal pulse width (jitter)	40 ns (< 250 ps RMS)	< 3 ns (< 80 ps RMS)
Pulse width increments	10 ns	10 ps
Pulse repetition rate	100 kHz	300 kHz, 2.5 MHz burst mode

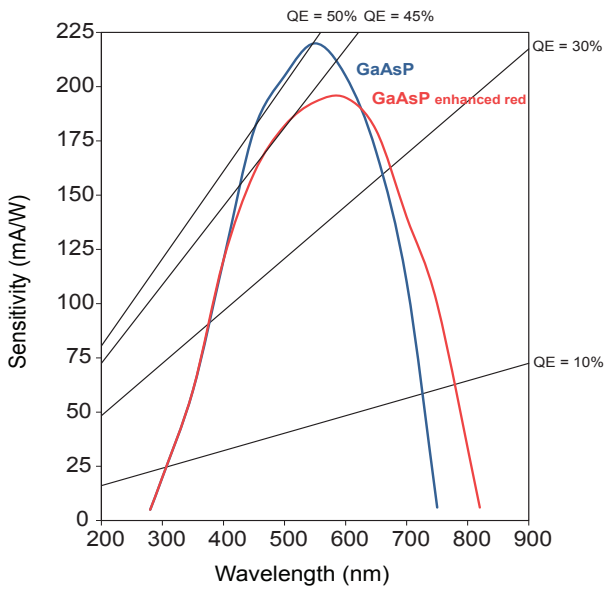
## Image intensifier

Photons are converted into electrons at the photocathode. These are accelerated towards the micro-channel plate by an electric field and hit the channel walls. Depending on the voltage across the channel, multiple electrons are generated by secondary emission.

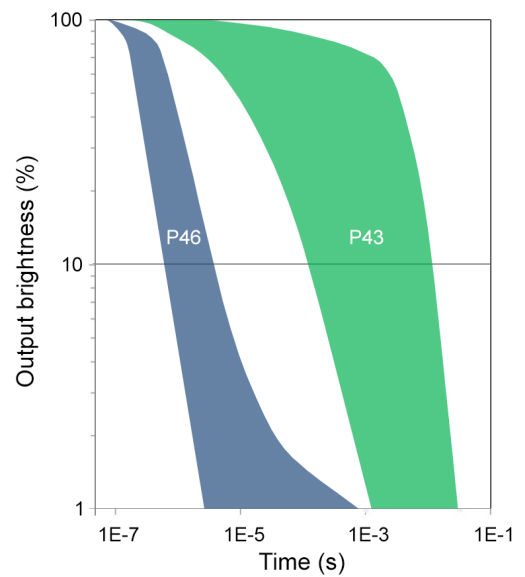
This cloud of electrons is accelerated towards the anode screen, where the electrons are converted back into photons by the phosphor layer. These photons are transferred to the camera by a fiberoptical taper.



## Intensifier sensitivity



## Phosphor response time



# IMAGE INTENSIFIER PROPERTIES

Image intensifier Proximity-focused Gen III GaAsP (filmless)

Photon gain (max) 36000 lm/m<sup>2</sup>/lux

Spatial resolution bare intensifier Up to 62.5 lp/mm

Phosphor P46 (P20, P43 on request)

Input window Borosilicate glass

### 18 mm Gen III intensifier

Effective area on input 12.78 x 12.68 mm

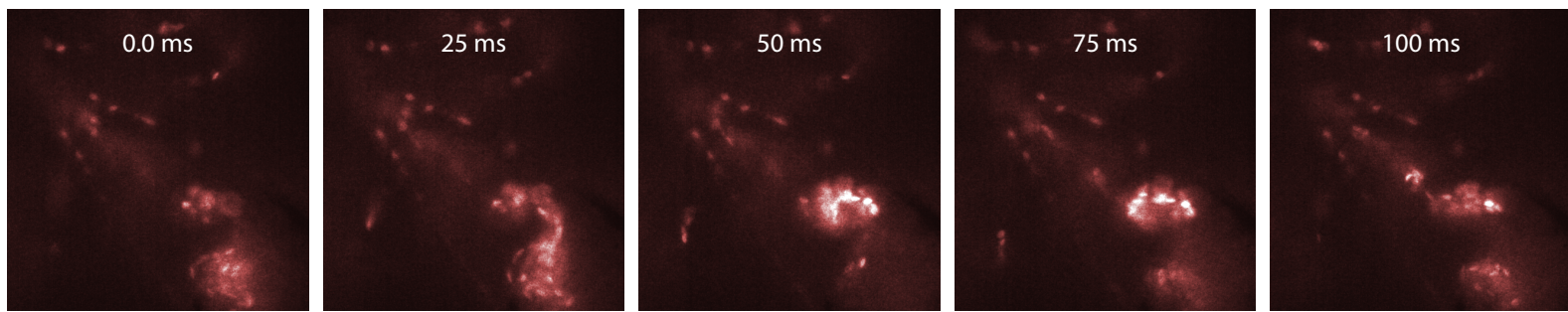
Input window thickness 5.5 mm

### 25 mm Gen III intensifier

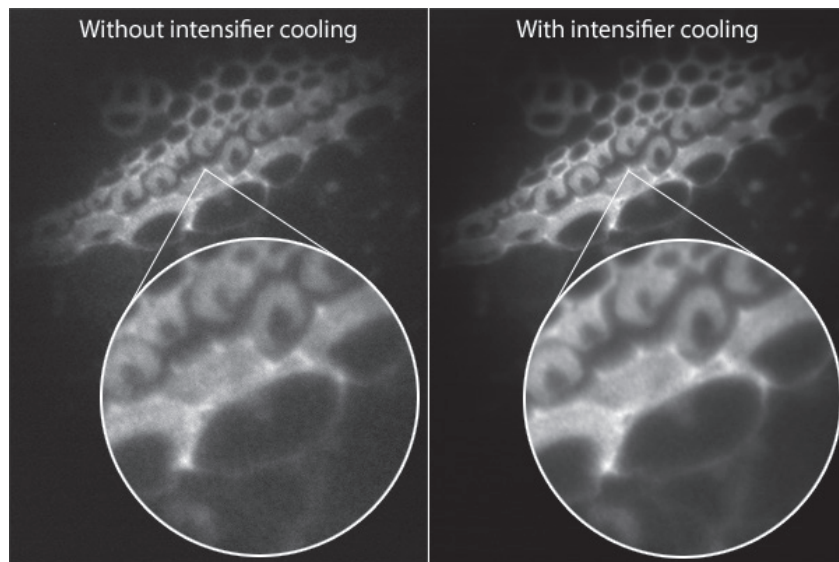
17.75 x 17.61 mm

6.0 mm

## Applications



Frames from a 2000 fps recording of the heart of a zebrafish. On average, the heart of a zebrafish beats 2 to 3 times a second. By labelling the blood cells with a DS\_red fluorescent dye, detailed images of the various stages of one heartbeat can be recorded.



Images of a lily of the valley sample without (left) and with (right) image intensifier cooling.