

# HiCAM Fluo

Cooled high-speed fluorescence camera



The HiCAM Fluo is a high-speed camera for fluorescence applications. It features a cooled built-in intensifier, enabling high speed recordings at poor light conditions. It records high resolution images at frame rates up to 2000 fps in the most challenging low-light conditions.

HIGH SENSITIVITY	The HiCAM Fluo is sensitive down to single photon level.
COOLED IMAGE INTENSIFIER	The fanless cooling ensures very low noise levels.
ULTRA-SHORT GATING	The camera's effective exposure time can be reduced to 10 ns (FWHM). This increases the range of light levels at which the camera can be used.
EASY COUPLING	Packed into a compact aluminium enclosure, it is easy to attach the HiCAM Fluo to any fluorescence microscope.
LONGTERM STREAMING	The recordings can be directly streamed to the hard disk. This enables recording times limited only by hard disk space.
FAST STREAMING	To transfer all the high-resolution image data, the HiCAM Fluo streams live over a CoaXPRESS (CXP) interface. The camera has four CXP connectors, each of which has a channel speed of 6.25 Gbit/s.

# Camera Specifications

	HiCAM Fluo 1000	HiCAM Fluo 2000
MAXIMAL RESOLUTION	1280 x 1024 pixels	1920 x 1080 pixels
FRAME RATE	1000 fps at full resolution 1500 fps at 1200 x 720 pixels 4000 fps at 640 x 480 pixels 7500 fps at 256 x 256 pixels	2000 fps at full resolution 2500 fps at 1280 x 960 pixels 5100 fps at 640 x 480 pixels 6400 fps at 512 x 384 pixels
PIXEL SIZE	6.6 um	10 um
PIXEL DEPTH	10 or 12 bit	8 bit
COMPUTER INTERFACE	Streaming CoaXPress	Streaming CoaXPress 2.0

## Integrated Features

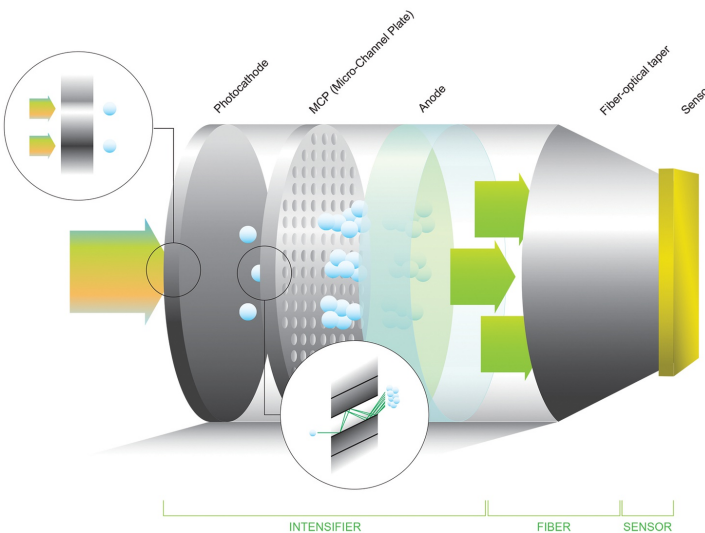
GAIN AND GAIN CONTROL ✓  
ANODE CURRENT LIMITER ✓

INTERNAL TRIGGER GENERATOR ✓  
SHUTTER CONTROL ✓

## Gating Properties

		Optional	Precision gating
GATING PULSE WIDTH RANGE	40 ns - 10 s	< 3 ns - 10 s	3 ns - 1 us
MINIMAL PULSE WIDTH (JITTER)	40 ns (<250 ps RMS)	< 3 ns (< 80 ps RMS)	3 ns (<250 ps RMS)
PULSE WIDTH INCREMENTS	10 ns	10 ps	250 ps
PULSE REPETITION RATE	100 kHz	300 kHz, 2.5 MHz burst mode	

## Image Intensifier

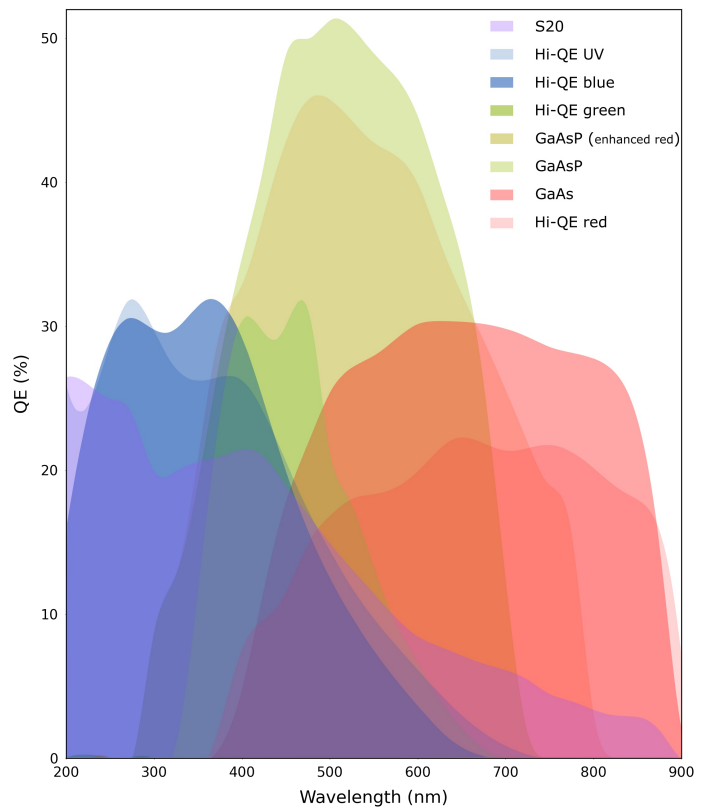


The HiCAM Fluo features a cooled built-in image intensifier. In the intensifier the incoming light encounters a photocathode. Here the photons are converted into electrons. The electrons are accelerated towards the micro-channel plate by an electric field and hit the channel walls. Depending on the voltage across the channel, multiple secondary electrons are generated. These electrons are accelerated towards the anode, where they are converted back into photons by the phosphor layer. The photons are transferred to the camera by a fiberoptical taper. In this way, the intensity of the light is enhanced drastically by passing through the intensifier.

# Spectral Response

With the advanced technology it becomes possible to capture clear images in low-light conditions. This is achieved by boosting the intensity of the incoming light.

The spectral response of the image intensifier is determined by the photocathode material. Each type of photocathode has its own absorption spectrum and quantum efficiency (QE).



# Phosphor Characteristics

Phosphor	Peak wavelength	Photons/electrons @ 5 kV	Decay time to 10%	Screen efficiency % (Optical / Electrical Watt)
P43 (optional)	548 nm	240	1.3 ms	8.7
P46 (standard)	530 nm	55	300 ns	1.8
FS (optional)	513 nm	96	12 us	4.2
	668 nm			
	768 nm			

# Intensifier Specifications

IMAGE INTENSIFIER	Proximity-focused Gen III GaAsP (filmless)
PHOTON GAIN (MAX)	36000 lm/m2/lux
PHOSPHOR	P46 (P20, P43, FS, on request)
INPUT WINDOW	Borosilicate glass
SPATIAL RESOLUTION BARE INTENSIFIER	Up to 62.5 lp/mm



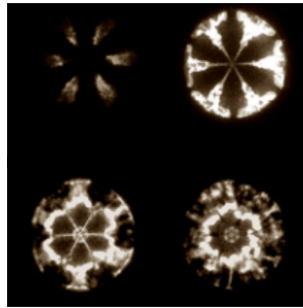
	18 mm Gen III intensifier	25 mm Gen III intensifier
EFFECTIVE AREA ON INPUT	12.78 x 12.68 mm	17.75 x 17.61 mm
INPUT WINDOW THICKNESS	5.5 mm	6.0 mm

# Applications

The HiCAM Fluo finds application in many fields in industry and research, including:

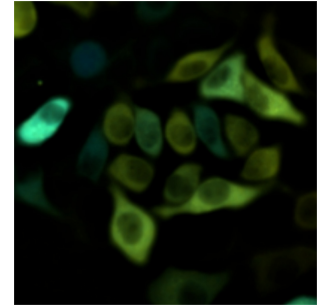
## Combustion research

Car engineers use our systems for imaging combustion cycles of fuel injecting engines.



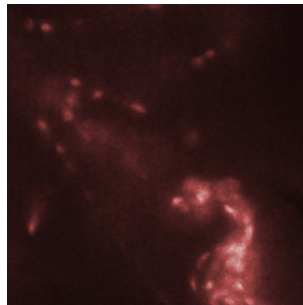
## Biomedical research

Researchers in biomedicine use our systems to, for instance, study the behaviour of cancer cells.



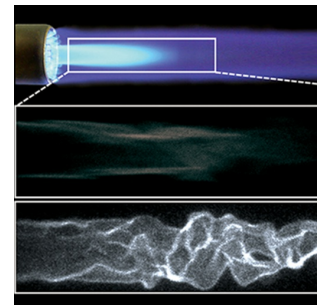
## Biology

Researchers in biology use our cameras to study the beating of the heart of a zebra fish.



## Other applications

- Research and development
- Chip manufacturing
- Time-resolved imaging of fluids
- Laser induced Fluorescence




The applications stated above are examples, for more information about your specific application, please contact us.

Lambert Instruments is dedicated to development, production and worldwide sales of products for **time-resolved imaging at low-light levels**.

Our mission is to enable our users to **reveal previously unseen phenomena**. Our products provide a possibility to record fast events at low-light conditions. Together with our software, we offer complete solutions to challenging imaging problems.



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