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Project Description

AXIS-PV: Ultrafast Visible-IR Streak Camera

AXIS-PV is the **only commercial camera** that can streak **450 spatial resolution points** (18 mm slit) with a time resolution of **1 ps** (measured at FWHM).

Stand-alone system with:

- High-end PHOTONIS bilamellar streak tube
- Available with S20, S25 and S1 photocathode
- -35°C cooled 16-bit CCD coupled by fiber optics
- EMI-rugged electronics
- Internal computer with remote control
- Full calibration on a fs laser

Applications:

- Femtochemistry
- Material Science
- Synchrotron Science
- Plasma diagnostics
- Raman spectroscopy
- Laser metrology

Project Details

Categories:
Ultrafast Streak Cameras

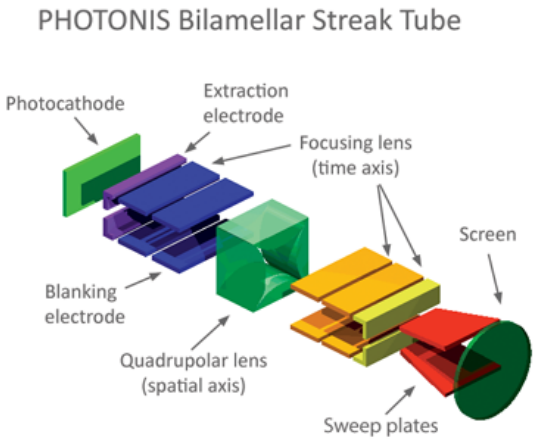
AXIS-PV SPECIFICATIONS

STREAK

PHOTONIS bilamellar family: These UNIQUE tubes use bilamellar optics to provide a picosecond temporal resolution

TUBE

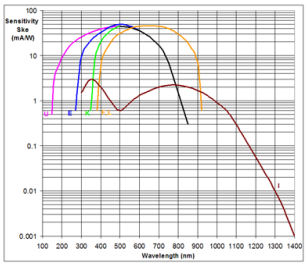
whilst maintaining excellent spatial resolution.



SPECTRAL RESPONSE

The streak tube can be built with different cathodes and input windows:

- S20 on sapphire (U), on glass (E) or on optical fiber window (K)
- S25 on glass (F) or on optical fiber window (L)
- S1 on glass (I) or on optical fiber window



SPATIAL RESOLUTION

Photocathode length (X): 18 mm

Spatial Resolution (dx): 40µm with 50% contrast

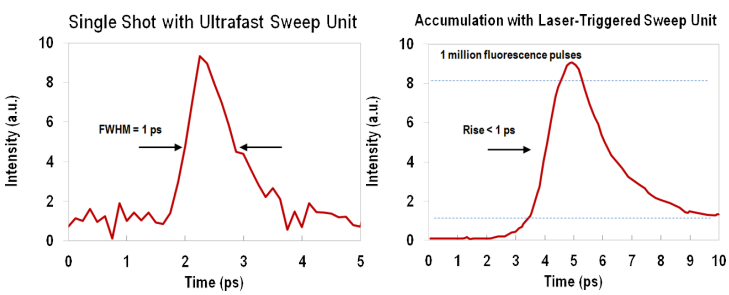
Number of spatial resolution units in screen (X/dx): 450 points

TIME RESOLUTION

Available Ranges (ΔT): 200 ps to 1 ms

Number of time-resolution units in screen (Nt): 675

Single-shot time resolution (δt): δt = ΔT / Nt * Limited to 1 ps



Time profile measured from a

Time profile measured from a single 100 fs laser pulse at 800 nm.

fluorescent sample illuminated by 100 fs laser pulses at 1 kHz repetition rate. This signal is the result of a 17-minutes accumulation (1 millions of shots).

TRIGGER

	Standard Single-Shot Sweep Units	Optional Laser-Triggered S Unit
Trigger pulse	Electrical	Femtosecond laser
Requirements	5-10 V in 50Ω, 50-200 ns duration	100 µJ @ 800 nm
Maximum repetition rate	100 Hz	5 kHz
Jitter	< 15 ps RMS	~ 1/2 ps (depending on the properties of the laser)

READOUT

Readout type: -30 °C Thermo-Electrically-Cooled Digital camera

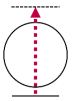
CCD chip size: 2048 x 2048 pixels; 27 mm x 27 mm

Digitizer: 16 bits

Coupling to streak tube: 1:1 Fiber optic taper

Cooling: 15-20 °C cooling water is required for the CCD camera

OPERATION MODES



Normal sweep
The sweep crosses the whole screen and ends outside.

Timing mode
The sweep always remains in the screen. It is used to synchronize the streak camera to the experiment.

Focus mode
The slit image is positioned at the center of the screen. The sweep trigger is disabled. This mode is used to align the experimental setup and to adjust the incident light level.

INTERNAL COMPUTER and SOFTWARE

AXIS-PV is an autonomous system that is operated locally by connecting a monitor, a keyboard and a mouse.

It comes with an internal computer that controls the streak tube supplies, the sweep circuits, monitors voltage stability, performs different self tests and safety checks. It can also control other optional peripherals via the USB port.

All required software comes pre-installed on the system. It is used to:

- Control whole system and acquire images
- Control the laser system (optional)
- Plot lineouts along time axis or space axis
- save image in different formats

Remote control over Gigabit Ethernet :

- “Windows Remote Desktop”
- Web base GUI
- High level device servers (TANGO, OPC, etc…) are available.

GENERAL

Electrical input: Universal AC, 110-240V, 50-60 Hz

Certification: CE

Tests and Calibration: Before shipping, each system is tested on a femtosecond laser at the Advanced Laser Light Source.

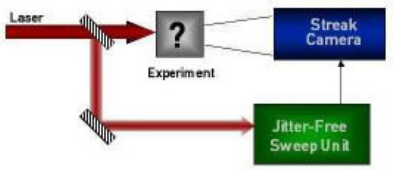
Installation and Training: A qualified engineer is sent to your laboratory to install the system and train users.

OPTIONS

Blanking circuits
With the blanking option, streak tube is blocked during the time the signals sweeps back to its start position. This feature is required when the optical signal lasts longer than the sweep range.

Remote control over Optical Ethernet
to operate system via optical Ethernet 1 Gbs (1000 Base SX).

Laser-triggered sweep unit for CPA lasers
Because of its 500 fs RMS jitter, this unit allows the analysis of ultrafast events at repetition rates up to 5 kHz while conserving the excellent spatial and temporal resolution of the AXIS streak camera. This is the ideal tools ultrafast spectroscopy with large dynamic range and high signal-to-noise ratio **It requires about 100 µJ per laser pulse.**



Only a fraction of the laser energy is taken to trigger photoconductive switches. This allows signal averaging over a large number of laser shots.

Timing fiducial input fiber
This assembly allows sending a timing UV pulse on the photocathode. This pulses is sent through a UV optical fiber. This is to record an absolute time reference on each shot.

Slow scan mode
Operation mode in which the sweep crosses the whole screen in 0.5 to 15 second. It is used to characterize spatial non-uniformity in the instrumental response by illuminating it with a constant brightness light source.

24V supply
To power the whole system with a DC voltage between 23V and 28V.

Spectrometer
spectrometer that fits special needs.

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