SUPERIOR HIGH-SPEED ANALYSIS

PHOTONIS
EXOSENS GROUP

Streak Tubes

Picosecond imaging across the entire spectrum

Photonis high resolution steak tubes set the standard in image resolution and reliability. With a wide range of spatial and temporal characteristics, Photonis Steak Tubes support extremely high-speed applications with simple connections to common camera equipment.

The Streak Tube is an inverter image intensifier with electrostatic focusing capable of resolving high-speed events (transient and recurrent) over a wide-range of input wavelengths. It can be used to measure the time variation of light intensity with respect to position (spatially time resolved measurement) or (when used with monochromator) the time variation of incident light intensity with respect to wavelength (time-resolved spectroscopy).

Photonis Streak Tubes are manufactured to the highest quality standards to ensure resolution, timing, and sensitivity are optimized. Custom tubes can also be developed specifically for your application.

Photonis Streak Tubes are applied in streak, framing or SynchroScan™ modes, with a wide range of available photocathodes for detection from low energy X-Ray to near infrared.

The high sensitivity, low noise photocathodes provide uniformity, excellent signal-to-noise ratio, and a high shutter ratio, while bilamellar electron optics support femtosecond temporal and extremely high spatial resolution.

Photonis Streak Tubes can provide spatial resolution up to 50 lp/mm, temporal resolution to sub-picosecond in streak mode, or exposure times less than 10ns in framing mode, making them a versatile solution to support a wide range of applications.

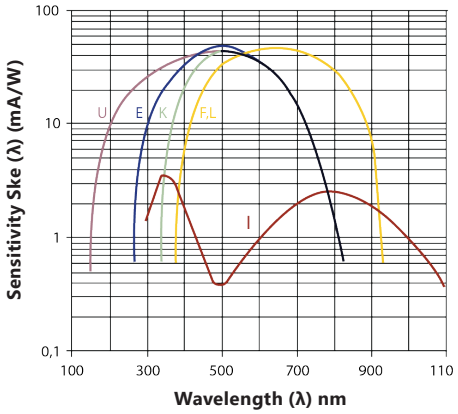
Key Features

- Rugged Construction
- Low Dynamic Distortion
- Highest Quality Photocathodes
- Stable Spectral Sensitivity, Including S1 Photocathodes

Applications

- Molecular and Plasma Physics
- Detonics and Ballistics
- Doppler Laser Interferometry
- Biology and Femtochemistry
- Fluorescence & Raman Microscopy
- Picosecond Laser Measurement

Cathode Spectral Sensitivity Characteristics



U - Standard multi-alkali on sapphire window

E - Standard multi-alkali on sapphire window

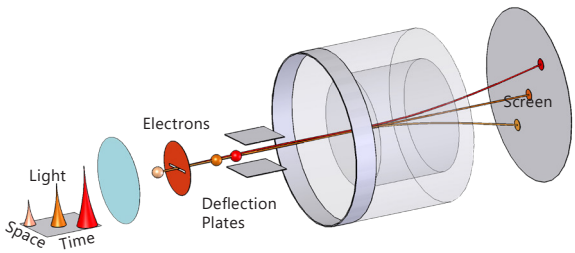
K - Standard multi-alkali on fiber optic window

L - ERMA on fiber optic window

I - S1 on glass window

F - ERMA on glass window

Streak Tube Schematic and Working Principle



A photon flux to be analyzed is first focused on a photocathode which converts the incoming photons (X-rays, UV, visible and near infrared) into electrons. These are accelerated by the electrode close to the photocathode and focused by electron optics onto the phosphor screen which converts the electrons pattern into a visible image. By applying a voltage ramp to a pair of deflection plates, this image is swept onto the screen creating a temporal axis perpendicular to the spatial axis, allowing the analysis of a temporal variation of the intensity of the original photon flux.

Streak Tubes for the Visible Spectrum

Basic Type Number[1]	Temporal Range of Tube	Accelerating Electrode	Operating Mode	Typ. Static Spatial Resolution (lp/mm)	Typ. Temporal Resolution (ps)	Typ. Radiant Power Gain[3]	Shutter Ratio (min)	Effective Photocathode Size[4] (mm)	Typ. Magnification	Output Window Diam.(mm)	Phosphor Screen[5]	Supply Voltage	Typ. Deflection Sensitivity (V/cm)
P500 Family													
P510	P	Slit	Streak	15	5	15	10^5	35x4	1.3	64	P22N	15	500
P510	N	Slit	Streak	30	150	30	10^5	35x4	0.75	64	P22N	15	500
P510	N	Grid	Streak/Frame	25	300	30	10^5	3x25	0.75	64	P22N	15	500
P520	P	Mesh	Streak/Frame	20	5	15	10^5	Ø10	0.75	64	P22N	15	300
P520	P	Mesh	SynchroScan™	20	5	10	10^5	Ø10	1.5	64	P22N	10	200
P900 Family													
P920	P	Mesh	Streak	20	2	20	10^5	Ø10	1.5	18	P22N	15	450
P920	P	Mesh	SynchroScan™	20	5	10	10^5	Ø10	1.5	18	P22N	10	300
P930[6]	N	Slit	Streak	50	100	40	10^5	18x3	0.8	30	P22N	15	700
P940[7]	P	Mesh	Streak	20	5	550	10^5	Ø8	2	18	P22N	16	125
P940[7]	P	Mesh	SynchroScan™	20	5	550	10^5	Ø8	2	18	P22N	16	125
P800 Family (Bilamellar Tube)													
P820	P	Mesh	Streak	25	2	n/a	10^6	10x1	1.5	30	P22N	10	400
P820	P	Slit	Streak	25	1	n/a	10^6	15x1	1.5	30	P22N	15	600

Streak Tubes for the X-Ray Spectrum

Basic Type Number	Temporal Range of Tube	Accelerating Electrode	Operating Mode	Typ. Static Spatial Resolution (lp/mm)	Typ. Temporal Resolution (ps)	Typ. Radian Power Gain	Shutter Radio (min)	Effective Photocathode Size (mm)	Typ. Magnification	Output Window Dia. (mm)	Phosphor Screen	Supply Voltage	Typ. Deflection Sensitivity (V/cm)
P500 Family													
P552X	P	Slit	Streak	10	20	n/a	n/m	15x3	1.3	64	P22N	15	500
P552X	P	Mesh	Streak	10	20	n/a	n/m	Ø10	1.5	64	P22N	15	500
P900 Family													
P952X	P	Mesh	Streak	n/m	n/m	n/a	n/m	Ø8	1.5	18	P22N	15	400
P800 Family (Bilamellar Tube)													
P850X	P	Slit	Streak	25	4[9]	n/a	n/m	10x1	1.5	30	P22N	15	400
P850X	P	Slit	Streak	25	1[9]	n/a	n/m	10x1	1.5	30	P22N	15	650

Table Notes

1) Type numbers are composed of four elements, e.g. P510NSU.

- Basic type number P510
- Temporal range: **N:** nanosecond, **P:** picosecond (see note 2)
- Accelerating electrode: **S:** slit, **G:** grid, **M:** mesh
- Spectral response **U,E,K,F,L** or **I**, see Cathode Spectral Sensitivity Characteristics. X-ray tubes are denoted by the letter **X**.

2) P: Temporal resolution < 100 ps; **N:** temporal resolution > 100ps. For exact values, see column 6 of the table.

3) Measured with an ERMA photocathode on a fiber-optic window at 600nm. Note that the photocathode radiant sensitivity (and thus gain) of P-tubes is about half that of N-tubes because of a highly conductive photocathode sublayer required for high temporal resolution.

4) Spatial dimension x temporal dimension.

5) Other phosphors are available, e.g. the P43 phosphor.

6) Rugged construction qualified for military applications.

7) Tube has an internal MCP for image intensification.

8) Closed tubes have metal windows/cathodes as specified (or supplied) by customers; open tubes are windowless allowing the user to insert his own metal cathode foil.

9) Two variants, P851X and P852X, allow the photocathode to be placed close to the X-Ray source.

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