

# Zyla-HF

## Ultrafast and High-Resolution Indirect Detection

### Key Specifications

- ✓ 100 fps & **New** 40 fps USB 3.0
- ✓ 5.5 MP high resolution sCMOS
- ✓ High throughput fibre-optic coupling
- ✓ Down to 0.9 e- read noise
- ✓ **New** >30 lp/mm resolution with YAG:Ce or LuAG:Ce scintillators

### Key Applications

- ✓ X-ray tomography
- ✓ Neutron tomography
- ✓ X-ray plasma diagnostics
- ✓ Transmission Electron Microscopy (TEM)
- ✓ X-ray imaging
- ✓ X-ray diffraction



# Introducing Zyla-HF

## Zyla Fibre Optic sCMOS- X-Ray Imaging at 100 fps



Andor's Zyla-HF outstanding design delivers the highest transmission and spatial resolution performance associated with state-of-the-art single fibre optic plate bonding, while also taking advantage of the very fast frame rate, ultra-low noise performance and exceptional field of view of the Zyla-HF.

Its compact format, multiple mounting points and modular input configuration for scintillators or beryllium filter integration allow ease of integration into laboratory setup or integrator (OEM) systems.

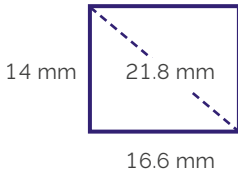
This unique feature combination makes the Zyla-HF the perfect detector platform for applications including X-ray imaging & tomography, electron microscopy and picosecond/nanosecond X-ray imaging when coupled to streak tubes or open MCPs.

## Features and Benefits

Feature	Benefit
Rapid frame rates	100 fps full frame sustained and <b>NEW</b> 40 fps USB 3.0 model
Fibre optic plate coupling <sup>•1</sup>	Direct bonding to the sCMOS sensor for maximum throughput. EMA statistical structure provides the lowest channel crosstalk
5.5 megapixel sensor format with high resolution and 6.5 µm pixels	Large 16.6 x 14 mm field of view
0.9 e <sup>-</sup> read noise	Lower detection limit than any CCD
Compact and light	Ideal for integration into space restrictive set-ups
Rolling and Global shutter	Maximum flexibility across all applications
Dual-Gain amplifiers	Extensive dynamic range of 33,000:1 @ 30 fps
ROI and pixel binning	User-definable ROI (1 pixel granularity) and hardware binning
Dynamic baseline clamp	Essential for quantitative accuracy of dynamic measurements
Hardware time stamp	FPGA generated time stamp with 25 ns accuracy
Modular input interface	Choice of high resolution / high throughput scintillators and Beryllium filters
<b>NEW</b> High resolution scintillator options	Fibre-optic plate coupled YAG:Ce or LuAG:Ce scintillators for high resolution imaging > 30 lp/mm CsI:Tl options for high throughput requirements
Integrated in EPICS	Ease of operation in EPICS software-based facilities such as partner particle accelerators and other large scientific experiments

### 1 sCMOS technology: high speed, low noise and large field of view

sCMOS overcomes the limitation of traditional slow-scan CCDs or interline technologies by offering simultaneously a large **16.6 x 14 mm (5.5 Megapixel)** field of view with high resolution **6.5 µm pixel**, **100 frames per second** and **ultralow 0.9 e<sup>-</sup> read noise**.



Zyla 5.5-HF offers a wide field of view

Learn more at: [andor.oxinst.com/learning/view/article/scmos-technology-what-is-scmos](https://andor.oxinst.com/learning/view/article/scmos-technology-what-is-scmos)

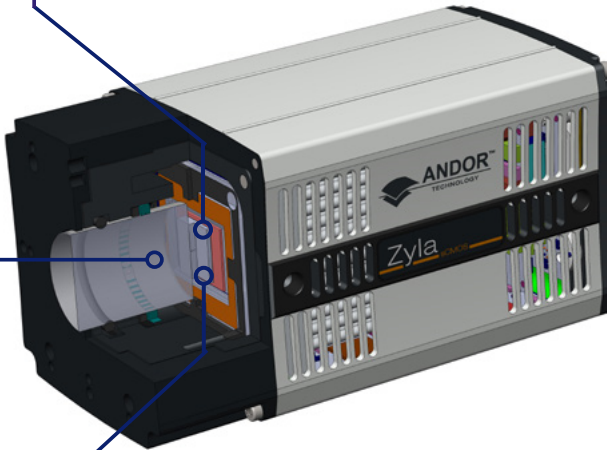
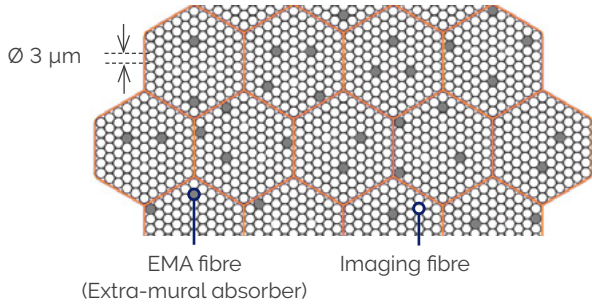
Array Size	Zyla 5.5: 10-tap (USB 3.0)	
	Rolling Shutter	Global Shutter
2560 x 2160 (full frame)	100 (40)	49 (40)
2048 x 2048	105 (53)	52 (52)
1920 x 1080	200 (107)	97 (98)
512 x 512	422 (422)	201 (201)
128 x 128	1,691 (1,691)	716 (716)

Zyla 5.5-HF delivers exceptionally high frame rates in both Rolling Shutter and Global Shutter modes.

### 2 High resolution AND high throughput AND low crosstalk fibre-optic plate

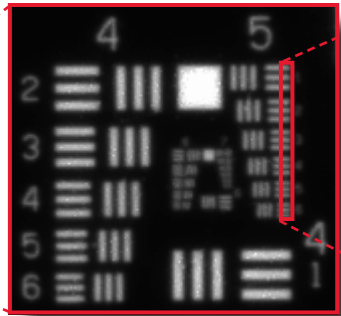
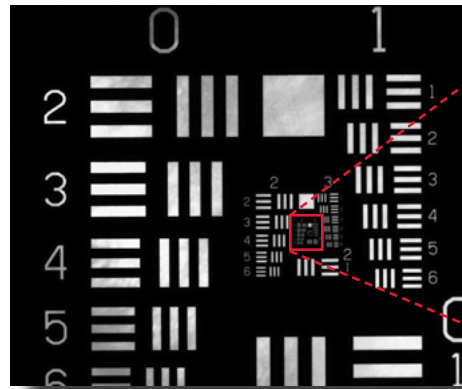
- ✓ **Single fibre direct bonding onto sensor**
- ✓ **EMA (Extra-Mural Absorption) statistical structure**

Light-absorbing glass structures are inserted into the matrix as replacements for individual light-conducting fibres, absorbing stray photons not contained by the individual fibres and leading to the lowest fibre crosstalk.

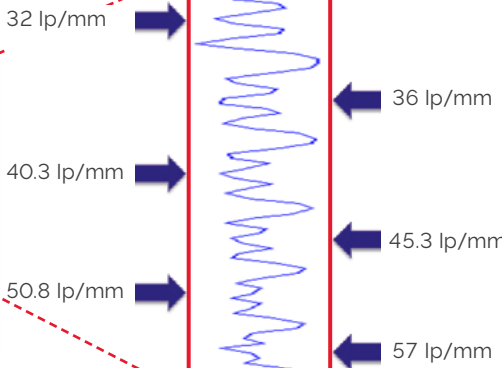


### 3 High spatial resolution

1:1 image of a USAF resolving Power Test Target 1951 acquired with a Zyla 5.5-HF (without scintillator, bare fibre optic plate) - features up to 50 lp/mm can be resolved.



Cross section



Technical Specifications

Sensor Specifications<sup>•2</sup>

Sensor type	Front Illuminated Scientific CMOS with FOP
Sensor matrix <sup>•3</sup>	2560 x 2160 pixels (W x H) 6.5 µm pixel size
Image area	16.6 x 14.0 mm 21.8 mm
Blemish specification	Grade 1 sensor as per manufacturer definition
Maximum quantum efficiency <sup>•4</sup>	60% @ 580 nm

Advanced Performance Specifications<sup>•2</sup>

Sensor operating temperature	0°C (up to 30°C ambient)		
Dark current, e-/pixel/sec @ min temp <sup>•5</sup>	0.14		
Pixel well depth	30,000 e <sup>-</sup>		
Read noise (e-) median [rms] <sup>•6</sup>		Rolling Shutter	Global Shutter (snapshot)
	@ 200 MHz	0.9 [1.2]	2.3 [2.5]
	@ 560 MHz	1.2 [1.6]	2.4 [2.6]
Linearity <sup>•7</sup>	Better than 99.8%		
Data range	12-bit and 16-bit		
Maximum dynamic range	33,000:1		
Pixel binning	Hardware Binning: 2 x 2, 3 x 3, 4 x 4, 8 x 8		
Trigger modes	Internal, External, External Start, External Exposure, Software Trigger		
Software exposure events <sup>•8</sup>	Start exposure - End exposure (row 1), Start exposure - End exposure (row n)		
Hardware timestamp accuracy	25 ns		
Anti-blooming factor	x 10,000		

Frame Rate Table - 12-Bit (16-Bit)<sup>•7</sup>

Array Size	Zyla 5.5 USB 3.0		Zyla 5.5 10-tap	
	Rolling Shutter	Global Shutter	Rolling Shutter	Global Shutter
2560 x 2160	40 (30)	40 (30)	100 (75)	49 (49)
2048 x 2048	53 (40)	52 (39)	105 (98)	52 (52)
1920 x 1080	107 (80)	98 (80)	200 (200)	97 (97)
512 x 512	422 (422)	201 (201)	422 (422)	201 (201)
128 x 128	1691 (1691)	716 (716)	1691 (1691)	716 (716)

Fibre Optic Plate<sup>9</sup>

EMA design	Statistical
Fibre diameter	3 µm
Core : cladding ratio	80 : 20
Image distortion	Shear: sub 6.5 µm pixel Gross: sub 6.5 µm pixel

For more information please refer to page 3.

Sensor Quantum Efficiency Curve<sup>•4</sup>

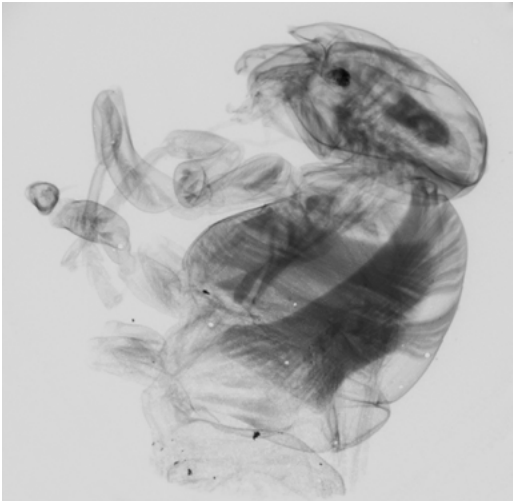
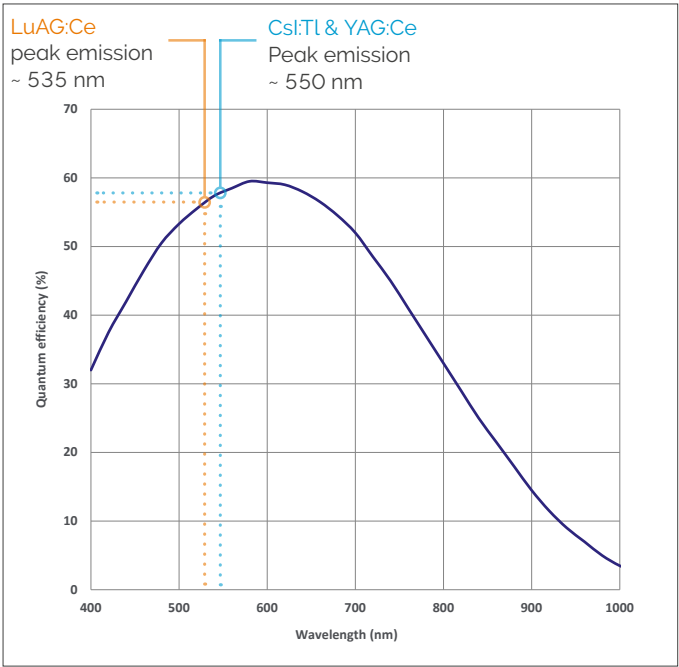


Image of a wasp acquired with and a 20 µm thick YAG:Ce scintillator fibre-optic coupled to a Zyla HF (10 s exposure) X-ray source Cu target, 40 keV, 2 W Image courtesy of Crytur

Scintillator Specifications<sup>•10</sup>

Best resolution			Best resolution/throughput balance			Best throughput		
Scintillator characteristics	Spatial resolution*	Energy range	Scintillator characteristics	Spatial resolution*	Energy range	Scintillator characteristics	Spatial resolution*	Energy range
YAG:Ce 20 µm thick on 3 mm FOP  SCT-YAGCE -25-020-00	>30 lp/mm	Best suited for broad 2-100 keV range	YAG:Ce 70 µm thick on 3 mm FOP  SCT-YAGCE -25-070-00	~ 20 lp/mm	Best suited for broad 2-100 keV range	CsI:TL 150 µm thick on 3 mm FOP  SCT-CSITLT -50-150-00	~10 lp/mm	Best suited for 10-100 keV range
LuAG:Ce 20 µm thick on 3 mm FOP  SCT-LUAGCE -25-020-00	>30 lp/mm	Best suited for 10-100 keV range	LuAG:Ce 70 µm thick on 3 mm FOP  SCT-LUAGCE -25-070-00	~ 20 lp/mm	Best suited for 10-100 keV range			

\*Spatial resolution is given at 10% MTF for the entire system Zyla HF, 1:1 fibre-optic plate and scintillator at 40 keV. Please note that spatial resolution will decrease at lower energies.



For more information about scintillator options please refer to the technical note: [Scintillators for Andor high energy detection cameras](#)



Creating the Optimum Product for You



Step 1. Select the camera type and connection

Camera Type

Description	Code
ZYLA 5.5-HF: 5.5 Megapixel scientific CMOS with FOP, Rolling and Global shutter modes, 100 fps, Camera Link 10-tap connection	ZYLA5.5X-FO
ZYLA 5.5-HF: 5.5 Megapixel scientific CMOS with FOP, Rolling and Global shutter modes, 40 fps, USB 3.0 connection	ZYLA5.5B-FO

Step 2. Select the required accessories

Accessories

Description	Order Code
Ø56 mm filter and Ø25.4 x3 mm scintillator holder for Zyla-HF	SCT-FLT_HLD-C025ZYL
Ø56 mm filter and 50 x 50 x 3 mm scintillator holder for Zyla-HF	SCT-FLT_HLD-H050ZYL
Beryllium filter, Ø56 mm, 200 µm thick	ACC-OPT-07875
For further information about high resolution / high throughput scintillators characteristics and ordering information for Zyla HF, please refer to the technical note <a href="#">Scintillators for Andor high energy detection cameras</a>	
5 meter cable for use with Axion frame grabber for Camera Link 10-tap models. (2 cables required)	ACC-ASE-13532
30 m fibre-optic extender solution for use with Zyla Camera Link 10-tap models.	ACC-ZYLFOX-10TAP-30M
100 m fibre-optic extender solution for use with Zyla Camera Link 10-tap models.	ACC-ZYLFOX-10TAP-100
15 m active USB 3.0 connector cable (power supply not required). For use with Zyla USB 3.0 models.	ACC-ASE-06887
50 m fibre optic USB 3.0 extender solution including power supply. For use with Zyla USB 3.0 models.	ACC-ASE-08762
100 m fibre optic USB 3.0 extender solution including power supply. For use with Zyla USB 3.0 models.	ACC-ASE-07860

For further information on PC workstations for Zyla, please refer to the technical note [PC Specifications for sCMOS](#)

Step 3. Select the required software

Software

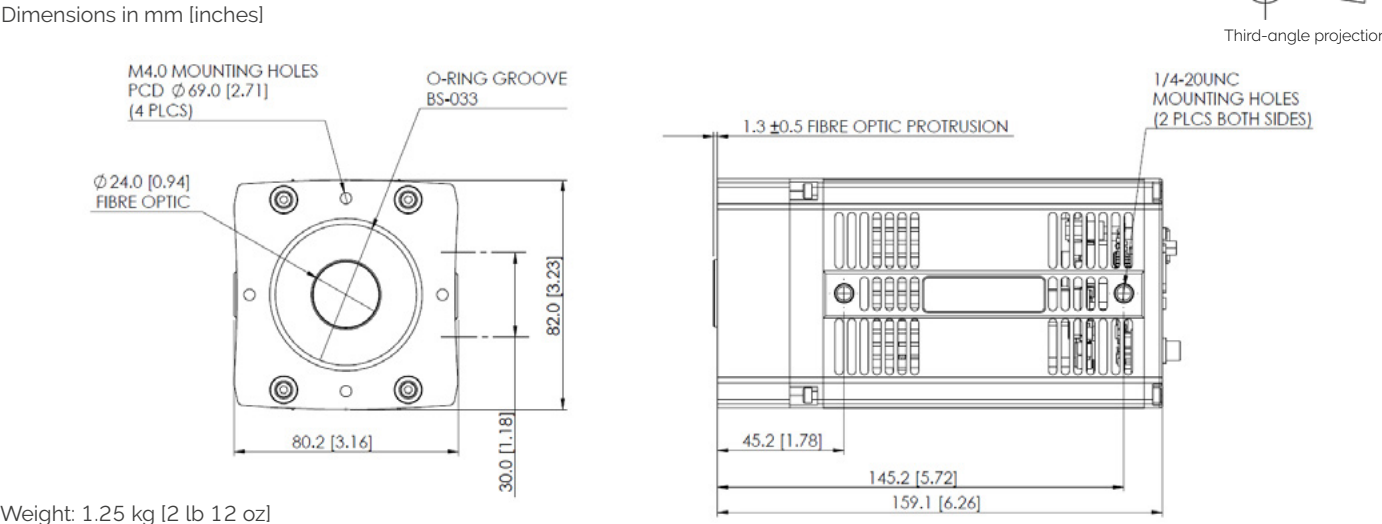
The Zyla-HF also requires at least one of the following software options:

**Solis for Imaging:** a 32-bit and fully 64-bit enabled application for Windows (8, 8.1 and 10) offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export.

**Andor SDK:** A software development kit that allows you to control Andor sCMOS cameras from your own application. Available as a 64-bit library for Windows (8, 8.1 and 10) and Linux. Compatible with C/C++, LabView and MATLAB.

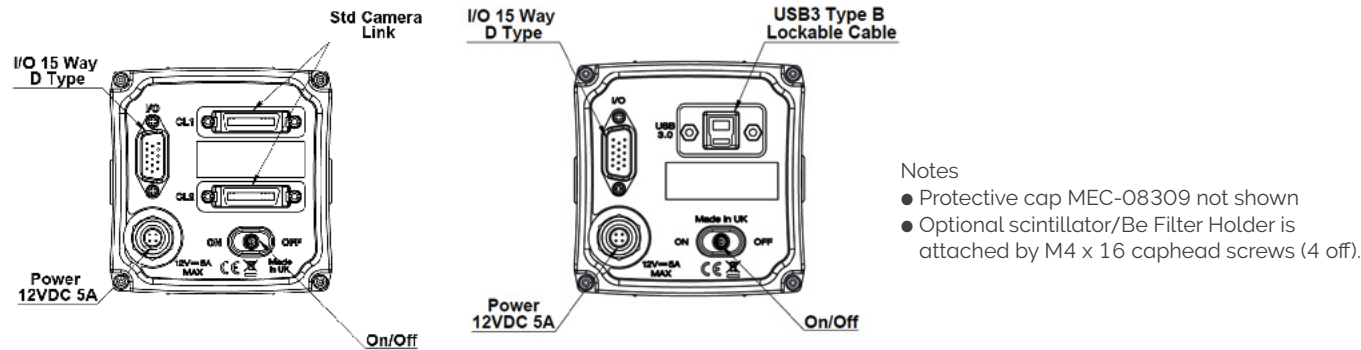
Third party software compatibility drivers are available so that the Zyla range can be operated through a large variety of third party imaging packages. See [andor.oxinst.com/third-party-software-matrix](http://andor.oxinst.com/third-party-software-matrix)

Product drawings



Weight: 1.25 kg [2 lb 12 oz]

Connections: Camera Link (Left) and USB 3.0 (right)



Connecting to the Zyla

**Camera Control**  
Connector type: 3 meter Camera Link 10-tap connectors or USB 3.0. (Longer lengths available as accessories).

**TTL / Logic**  
Connector type: 15 way D Type with TTL I/Os for External Trigger, Frame Readout and Fire Pulse.

Best Practice Guidelines

- ✓ Camera is susceptible to shock damage. The protective plate should always be fitted when the camera is not in use.
- ✓ The FOP should always be protected when mounting to another surface, both surfaces must be free of contamination to avoid damage.
- ✓ Dust or contamination can be removed by the drop and drag optical cleaning technique. For cleaning, use lens tissue with a suitable solvent e.g. spectroscopic grade solvent.
- ✗ When mounting a scintillator, do not apply a force exceeding 30 N onto the fibre optic surface.
- ✗ Do not use abrasives, corrosive solvents, avoid impact or point contact.
- ✗ Beryllium foil is very brittle in nature therefore extreme care should be taken to avoid shock damage. If the foil is broken there is a health risk. Please contact Andor for further information if required.

15-way D-type pinouts		
1	ARM	Output
2	Aux_Out_1*	Output
3	FIRE row n	Output
4	FIRE row 1	Output
5	Aux_Out_2	Output
6	Ground	GND
7	External Trigger	Input
8	Spare Input	Input
9	Reserved	N/A
10	Reserved	N/A
11	Reserved	N/A
12	Reserved	N/A
13	Reserved	N/A
14	Reserved	N/A
15	Reserved	N/A

\* Aux\_Out\_1 is configurable as Fire, Fire n, Fire All or Fire Any. Refer to the Zyla hardware manual.

# Order Today

Need more information? At Andor we are committed to finding the correct solution for you. With a dedicated team of technical advisors, we are able to offer you one-to-one guidance and technical support on all Andor products.

For a full listing of our local sales offices, please see: [andor.com/contact](http://andor.com/contact)

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Beijing  
Phone +86 (10) 5884 7900  
Fax +86 (10) 5884 7901



### Items shipped with your camera:

- For Camera Link 10-Tap Models: 1 x Camera Link Card and 2 x 3 meter connector cables.
- For USB 3.0 models: 1 x USB 3.0 PCIe Card and 1 x 3 meter USB 3.0 cable (Type A to B)
- 1x Power supply with mains cable
- 1x 7-way Multi I/O timing cable, offering Fire, External Trigger and Arm (3 meter)
- 1x Quick start guide
- 1x Individual system performance sheet
- 1x Protective cap (MEC-08309)
- Electronic copy of user guide

### Minimum Computer Requirements:

- 2.68 GHz Quad Core
- 4GB RAM (increase RAM if to be used for continuous data spooling)
- Hard Drive:  
Minimum 450 MB/s continuous write for USB 3.0 models  
Minimum 850 MB/s continuous write for Camera Link 10-tap models
- PCI Express x4 or greater for USB 3.0 models
- PCI Express x8 or greater for Camera Link 10-tap models
- Windows (8, 8.1 or 10) or Linux

\* See technical note entitled: 'PC Specifications for sCMOS

\*\* Andor supply PC workstations for Zyla, see page 8

### Operating and Storage Conditions

- Operating Temperature: 20°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C

### External Power Supply Compliance

- UL-certified for Canada and USA
- Japanese PSE Mark

### Power Requirements

- Power: +12 VDC  $\pm$  5% @ 5A
- Ripple: 200 mV peak-peak 0 - 20 MHz
- 100 - 240 VAC 50/60 Hz external power supply

### Footnotes: Specifications are subject to change without notice

1. IMPORTANT-Due to the sensor/ fibre optic being exposed to environments outside of Andor's control there is no warranty on the sensor. For full details of Andor's Warranty Policy please refer to andor.oxinst.com/service-and-support. Please refer to the best practice guidelines on page 7.
2. Figures are typical unless otherwise stated.
3. Edge pixels may exhibit a partial response.
4. Quantum efficiency of the sensor at 20°C as supplied by the sensor manufacturer.
5. Dark current measurement is averaged over the CCD area excluding any regions of blemishes.
6. Readout noise is for the entire system and is taken as a mean over the sensor area excluding any regions of blemishes. It is a combination of sensor readout noise and A/D noise.
7. Linearity is measured from a plot of counts vs exposure time under set photon flux up to the saturation point of the system.
8. Software Exposure Events provide rapid software notification (SDK only) of the start and end of acquisition, useful for tight synchronization to moving peripheral devices e.g. stages.
9. Data as supplied by the fibre optic plate manufacturer.
10. Data as supplied by the scintillator manufacturer. Scintillator peak emission at 550 nm. Please contact your local Andor representative to inquire about other scintillator options.



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