Camera Parameter and Guidelines for Picasso

- The following values are typical values for each camera. For the values specific to your camera refer to the performance sheet supplied with your camera.
- Typical QE values are given for some common laser lines. For different laser lines, you will need to enter QE values that are at the emission wavelength that will be measured at the camera sensor, not the excitation wavelength of the laser. You can use the camera windows calculator tool for precise values including effect of camera window for any wavelength at: [Camera Window Selector](#)
- The pixel size that should be entered is the effective pixel size in nm for the total system magnification (i.e. that of the objective and any additional magnification). The values shown below are for a total magnification of 100x. For other total magnifications adjust the value accordingly.

Sona-6 Cameras

Sona-6 cameras are back-illuminated sCMOS cameras with the popular 4.2 Megapixel 6.5µm pixel size sensor format. The relatively smal pixel of these sensors helps with localisation precision. There are 3 different modes – HDR mode allows high speed and wide dynamic range which will work well with the fast-blinking imaging of localisation based super resolution

Parameter	Low noise (12-bit)	High Dynamic Range (16-bit)	High Speed (11-bit)*	Notes
EM Gain	1			Applies to EMCCD only
Baseline	100			Camera Bias value is set around 100
Sensitivity	0.45*	1.0	1.15	e- per ADC count
Quantum Efficiency	Excitation laser: 561nm: 0.95 Excitation laser 640 nm: 0.86			Peak QE is 95% at 560nm
Pixel size (nm)	65 (6500/100x total magnification)			Native pixel size is 6.5µm

- Note that all Sona-6 model cameras produced after January 2023 or upgraded to the latest specification have a sensitivity of 0.32 for low noise mode and an additional high speed mode.

Sona-11 Cameras

Sona-11 cameras are back-illuminated sCMOS cameras with a larger 11μm pixel size. There are no differences in image quality or precision between 12 and 16-bit modes for the same settings. 12-bit mode allows for higher speeds and is thus the recommendation for fast imaging and short exposures. Use 16-bit mode only if the dynamic range of 12-bit mode has been exceeded and at smaller ROIs .

Parameter	Fastest frame rate (12-bit)	High Dynamic Range (16-bit)	Notes
EM Gain	1		Applies to EMCCD only
Baseline	100		Camera Bias value is set around 100
Sensitivity	0.603	1.24	e- per ADC count
Quantum Efficiency	Excitation laser 561nm: 0.95 Excitation laser 640 nm: 0.86		Peak QE is 95% at 580nm
Pixel size (nm)	110 (11000/100x total magnification)		Native pixel size is 11μm

Zyla 4.2 PLUS and ZL41 Cell 4.2

Front-illuminated sCMOS cameras using the same sensor format as Sona-6 i.e. 4.2 megapixel and 6.5μm pixel size. Both ZL41 Cell 4.2 and Zyla 4.2 PLUS cameras are based around the same sensor so share the same general parameters required for Picasso. The recommended mode is 540 Mhz Low noise and High Well Capacity as this gives the best combination of fast frame rate and dynamic range.

Parameter	540 Mhz High Well Capacity	540 Mhz Low noise	540 Mhz Low noise and High Well Capacity	200 Mhz High Well Capacity	200 Mhz Low noise	200 Mhz Low noise and High Well Capacity	Notes
EM Gain	1						Applies to EMCCD only
Baseline	100						Camera Bias

						value is set around 100
Sensitivity	8.1	0.28	0.52	8.4	0.25	0.55	e- per ADC count
Quantum Efficiency	Excitation laser 561nm: 0.82 Excitation laser 640 nm: 0.76						Peak QE is 82% at 560nm
Pixel size (nm)	65 (6500/100x total magnification)						Native pixel size is 6.5µm

iXon Life and Ultra EMCCD 888

The iXon 888 series cameras feature a 1 Megapixel EMCCD sensor with 13µm pixel size. The larger pixel size tends to require additional magnification of the Dragonfly to adequately sample the image. With inherent higher sensitivity than sCMOS, can allow high speeds but at smaller regions of interest. Use the highest readout speed (30 Mhz) and Overlap set on. EM gain should be in the range 300-600 to allow signals to be boosted above the noise floor for high SNR while avoiding saturation.

Parameter	**30 Mhz, 16-bit (preamp 1)**	**30 Mhz, 16-bit (preamp 2)**	**10 Mhz, 16-bit (preamp 1)**	**10 Mhz, 16-bit (preamp 2)**	**Notes**
EM Gain	As entered				EM gain should be set 4-5x higher than the read noise (see performance sheet).
Baseline	500				Camera Bias value is set around 500
Sensitivity	18.0	5.4	15.8	4.0	e- per ADC count
Quantum Efficiency	Excitation laser 561nm: 0.97 Excitation laser 640 nm: 0.91				Peak QE is ~95% at 560nm
Pixel size (nm)	130 (13000/100x total magnification)				Native pixel size is 13µm