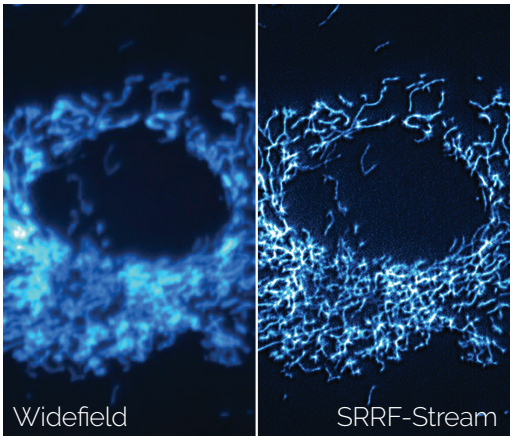
SRRF-STREAM SUPER-RESOLUTION TECHNOLOGY

ANDOR
an Oxford Instruments company

NEW SRRF-Stream for Super Resolution

The iXon has proven extremely popular for single molecule based 'pointillist' super-resolution microscopy approaches (e.g. STORM, PALM). SRRF-Stream is a NEW real time super-resolution 'nanoscopy' functionality that operates on Andor's iXon EMCCD cameras.



SRRF-Stream unlocks the means to perform real time super-resolution microscopy on conventional modern fluorescence microscopes. Resolution improvement of most datasets ranges from 2- to 6-fold (150-50 nm final resolution) over typical wide field image data.

Available for both 888 and 897 models, SRRF-Stream camera technology converts most modern conventional microscopes into a real time super-resolution microscope, for imaging live and fixed cells with low excitation intensities and without the need for specialized photoswitchable fluorophores, working with well-established labels like GFP.

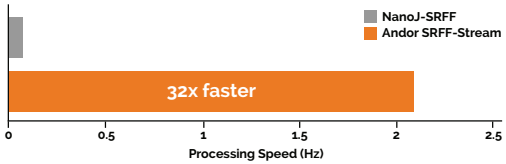
Image comparison of a mitochondrial structure within a fluorescently labelled BPAE cell, recorded with a widefield fluorescence microscope and a SRRF-Stream enabled iXon Life 888 EMCCD camera. A x63 objective was used, with further 2x magnification and 560 nm illumination. 100 raw 'input' images were recorded for every resultant super-resolution image, resulting in a super-resolution image rate of 0.5 Hz. For a fair comparison without SRRF-Stream, 100 standard widefield images were recorded and then averaged.

iXon SRRF-Stream Workflow Advantage

Adopting the recently developed SRRF technology from the lab of Dr Ricardo Henriques, University College London (UCL), and working in close collaboration with Dr Henriques, Andor have enhanced the technology to run optimally on iXon EMCCD cameras.

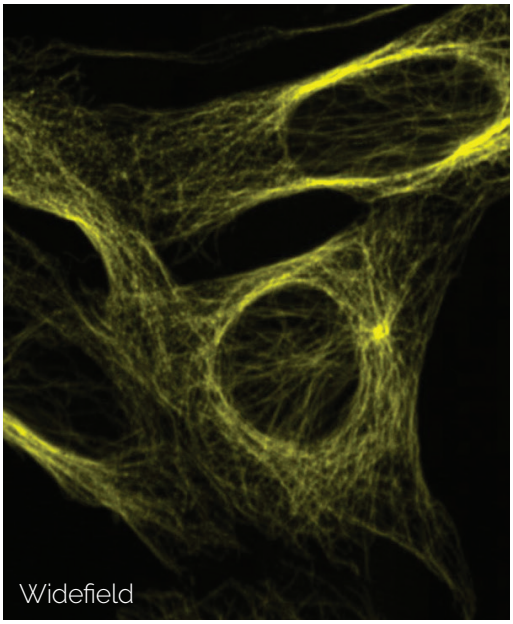
Andor are also expert in advanced GPU processing optimization techniques, employed in this instance to execute the SRRF algorithm up to 30x faster than the existing ImageJ-based post processing implementation of SRRF (NanoJ-SRRF). This significant acceleration enables workflow enhancement, by allowing data acquisition and SRRF processing to operate in parallel.

This graph compares the rate of processing of blocks of 100 raw input images (1024 x 1024 pixels), to yield resultant SRRF super-resolution images of 4096 x 4096 pixels. SRRF-Stream is compared



to NanoJ-SRRF, the processing occurring on the same Nvidia GTX 1070 GPU card. The SRRF-Stream acceleration subsequently allows data acquisition and processing to happen in parallel, yielding a further workflow improvement over NanoJ-SRRF.

Since processing is now much faster than the camera can acquire data, 'SRRF-Stream enabled' cameras now accomplish **real time super-resolution**, with **large field of view** super-resolution images.



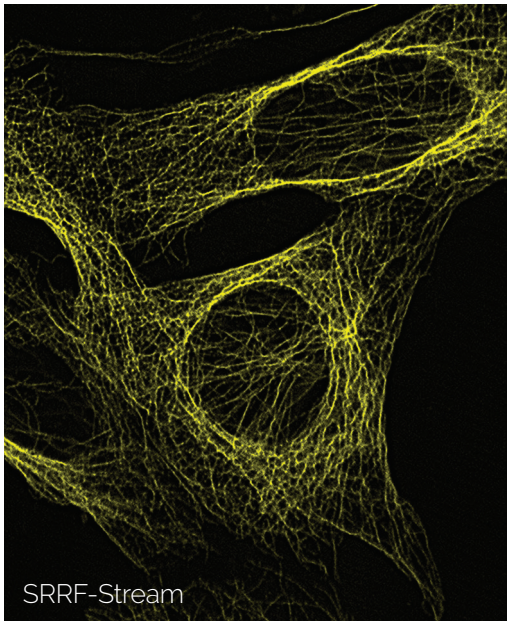


Image comparison of a microtubule structure within a fluorescently labelled BPAE cell, recorded with a widefield fluorescence microscope and a SRRF-Stream enabled iXon Life 888 EMCCD camera.

A x63 objective was used, with further 2x magnification and 560nm illumination. 100 raw 'input' images were recorded for every resultant super-resolution image, resulting in a super-resolution image rate of 0.5 Hz. For a fair comparison without SRRF-Stream, 100 standard widefield images were recorded and then averaged.

> Having thoroughly tested SRRF-Stream in our own lab, we are very impressed by both the workflow and also the ability to now utilise larger fields of view for live cell super-resolution.
>
> By seamlessly combining the SRRF algorithm with the high-performance of the iXon, we have accomplished the world's first super-resolution camera for fluorescence microscopy.
>
> Dr Ricardo Henriques, Quantitative Imaging and Nanobiophysics Group, UCL

Key Features

Real Time - enhanced workflow, avoids post-processing. View in 'Live Mode'.
Low Excitation Intensities (mW-to-W/cm^2) - prolonged live cell observations and accurate physiology.
Conventional Fluorophores, e.g. GFP - simple labelling, no photo-switching required.
Live Cell Dynamics - full FOV super-res images every 1-2 seconds. >10 fps using ROI or Crop Mode.
Cost-Effective - convert conventional fluorescence microscopes to super-resolution microscopes.

Find out more at
andor.com/srrf-stream

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