abbelight now, we see

The future of imaging, from microscopy to single-molecule localization

Product overview 2020

abbelight

Now, we see.

Preparation

Optimal sample preparation requires multi-disciplinary know-how

Imaging

High-quality and reliable results depend on precise instruments

Analysis

Handling of data requires powerful and tailored analytical tools

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Light up your research

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Single Molecule Localization Microscopy (SMLM) combines quantitative information with the highest resolution achievable in light microscopy, and is therefore a game changer in many biological studies.
To efficiently accommodate SMLM in a research workflow, it is crucial to build a diverse expertise ranging from sample preparation to image acquisition and data analysis.

abbelight offers are designed to guide and provide support with the best instruments, software and expertise, to speed-up the imaging workflow within your research applications.

abbelight research
Advice, samples and reagents for your projects

abbelight instruments
The best performances

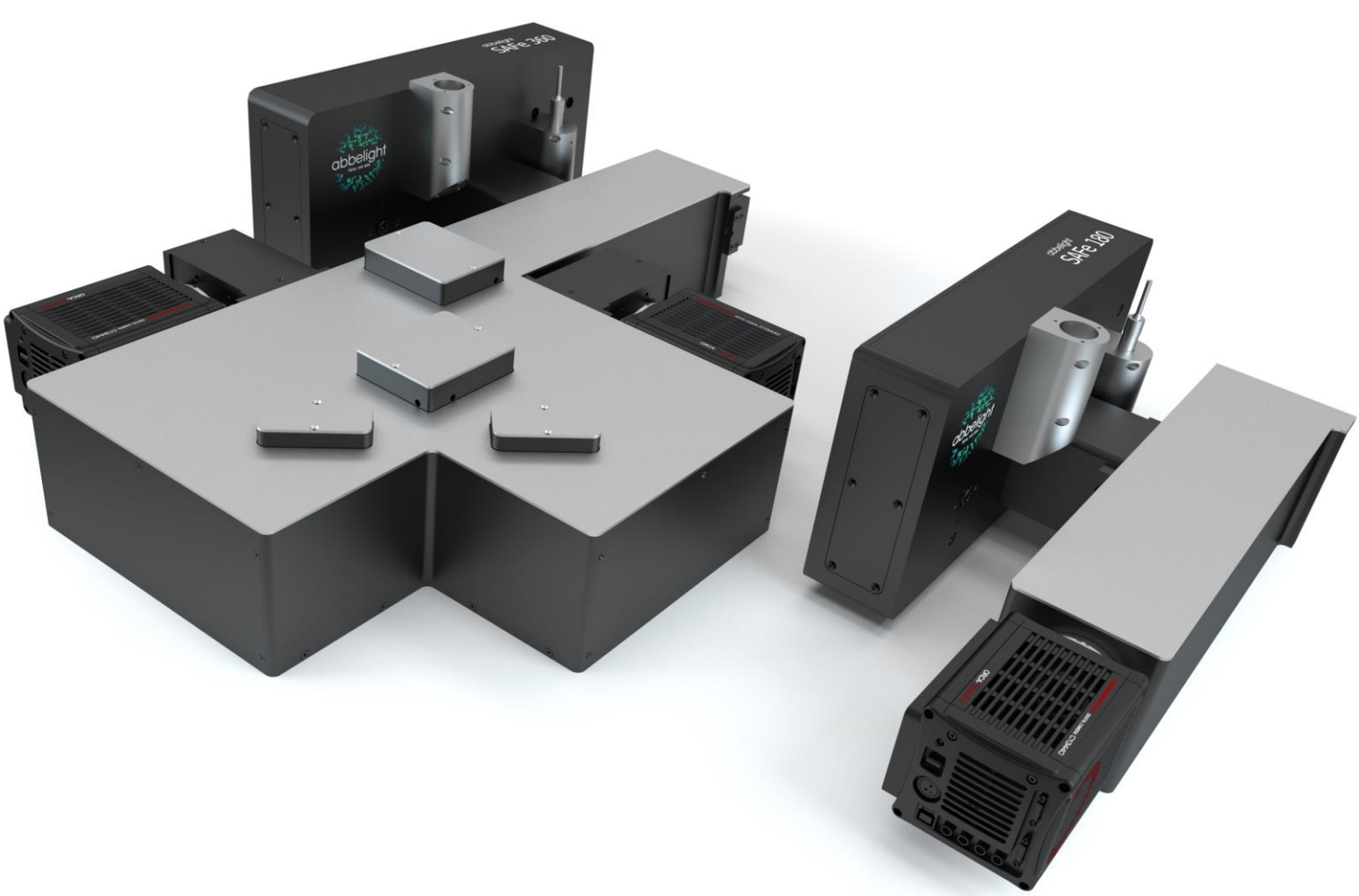
abbelight data
An all-in-one software designed for acquisition, processing and analysis

abbelight
Our solutions

abbelight research
Biological samples
Reagents
Advice, protocols and training

abbelight instruments
Evolutive add-ons for inverted microscopes
SAFe 180 – Large field of view TIRF and easy single-molecule imaging
SAFe 360 – High precision, multicolor 3D single-molecule imaging

abbelight data
Acquisition and real-time image reconstruction
Advanced processing
Easy visualization and analysis



abbelight
About us

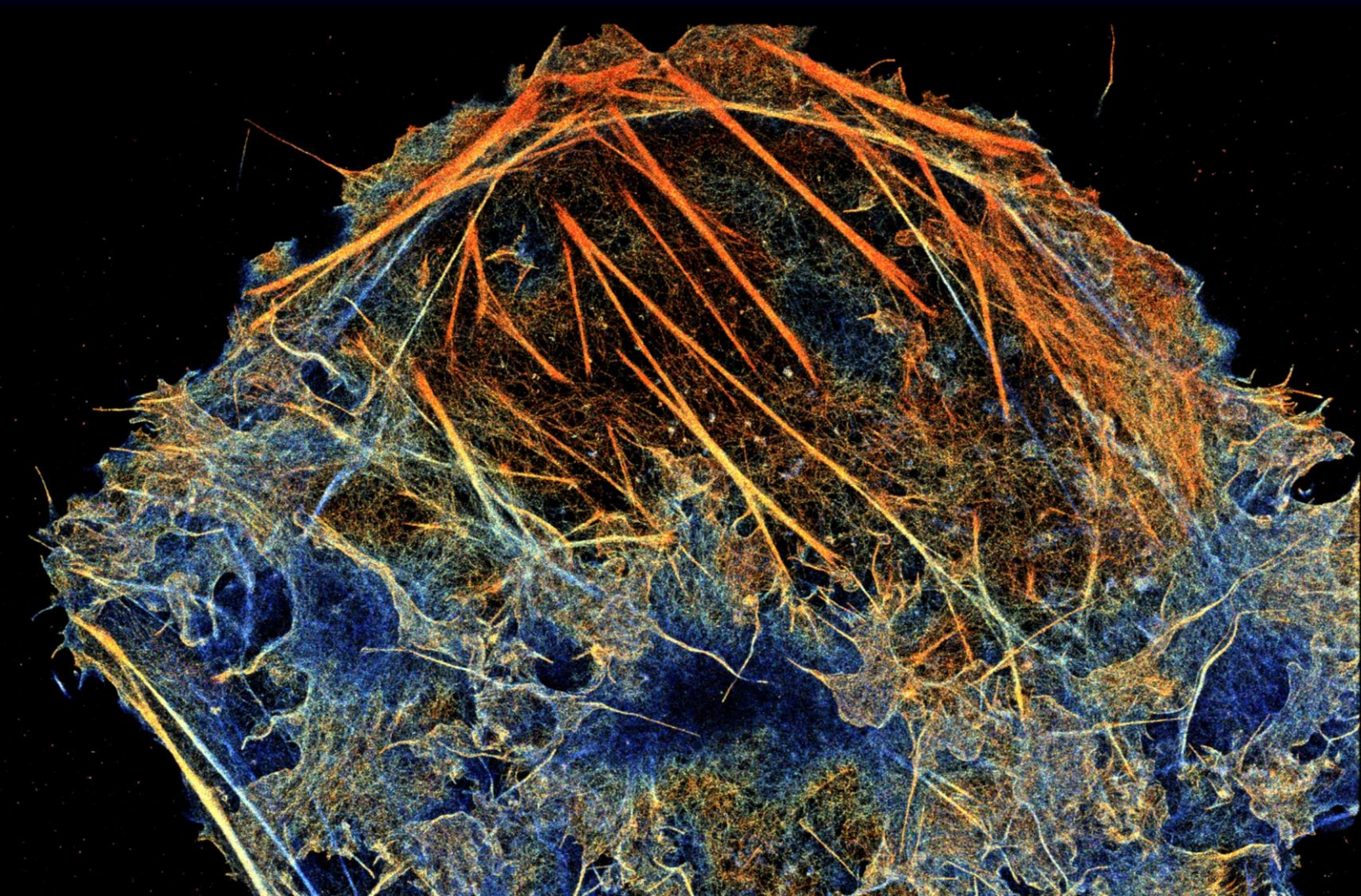
abbelight is the result of 10 years of academic research on cutting-edge detection methods in fluorescence microscopy; our team holds a vast pool of knowledge in every aspect of localization microscopy.

Still fully immersed in the research environment, abbelight converts the most advanced technology into robust, evolutive, and accessible products; its software developers make them fast, efficient and intuitive to use for their clients.

Our focus

Develop features that matter for research and researchers:

- Speed up not only data acquisition, but the full imaging workflow
- Ensure transparency about product and technology
- Produce reliable and reproducible data with fewer artifacts - not just better images
- Reveal and fully exploit data complexity



abbelight research

SAFe accelerator by researchers for researchers

Our team of scientists is involved in multi-disciplinary research, education and international training.
With our SAFe accelerator we provide time, knowledge and expertise to fast-track the imaging workflow and overcome experimental hurdles during the first steps of a new project.

Your biological question

Feasibility study
Free & confidential

Planning
Define goals, Attribute tasks
1 WEEK

Experiments
Collaborative & efficient
1– 5 MONTHS

Interpretation
Sharing time & expertise
2– 4 MONTHS

Data, images, protocols ready for publication

SAFe samples and reagents for calibration and training

Cell type
- Cos7
- U2OS
- HeLa
- HEK
- primary neurons
- macrophages
- *Escherichia coli*

Cell structure
- microtubules and actin cytoskeleton
- spectrin cytoskeleton
- clathrin coated pits
- mitochondria
- podosomes
- bacterial cell wall and membrane

Fluorophores
- Atto 488, WGA-AF ® 488
- AF ® 532, CF ® 532, Cy3b
- AF ® 555, AF ® 594, CF ® 555, AF ® 568, CF ® 568, Cy5, MemBrite™ 568, TMR
- AF ® 647, CF ® 647, AF ® 680, CF ® 680, MemBrite™ 640, Actin-stain 670

Ready-to-use solutions for localization microscopy (dSTORM), compatible with the dyes listed above and more.

abbelight provides two solutions to induce photoswitching of fluorophores:
- SmartKit is a mounting medium for fixed cells
- Blinking Pad maintains non-adherent biological objects immobilized on the coverslip

- 10 doses per box
- 200 µL per dose
- 30 sec preparation
- 2 months in a fridge
- High efficiency and stability over time

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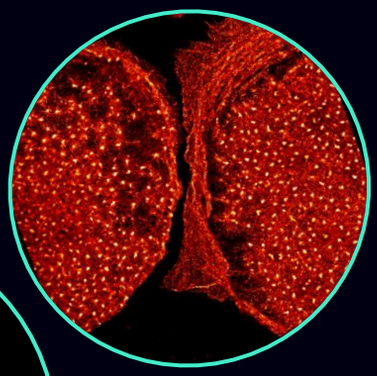
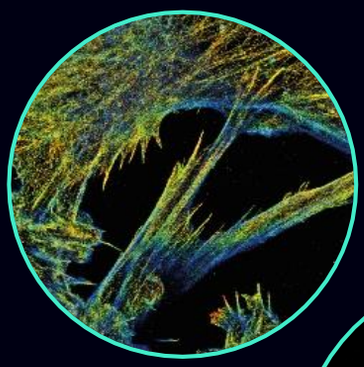
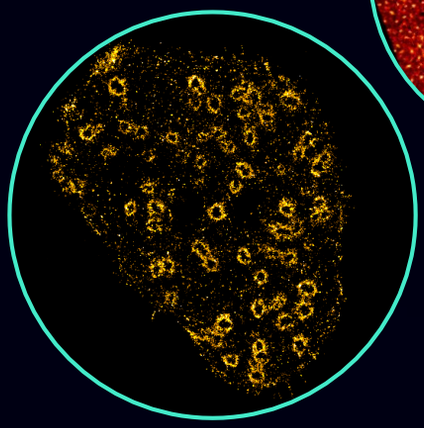
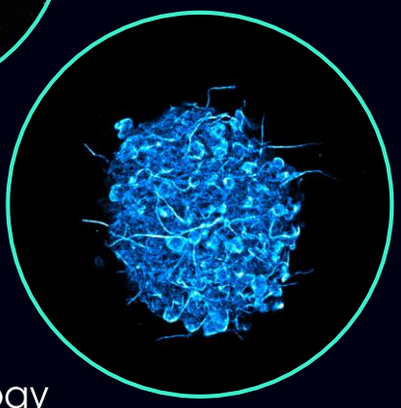




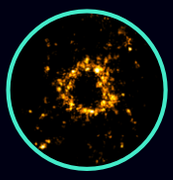


Mechanobiology



Immunology

Oncology



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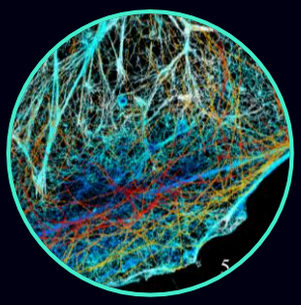
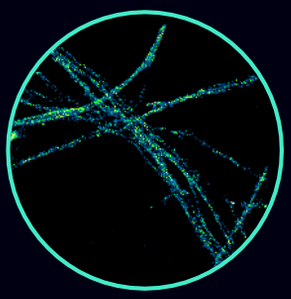
Cellular biology

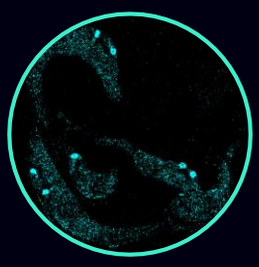
Neurosciences



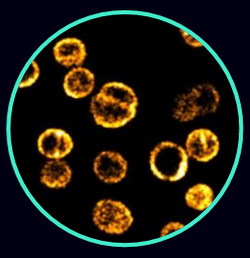
Parasitology

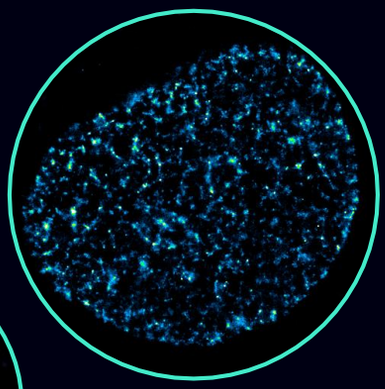
Genome

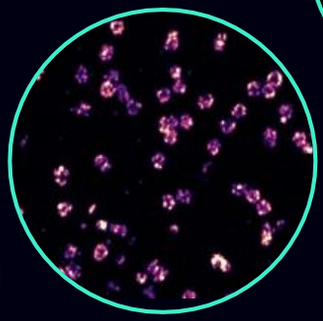


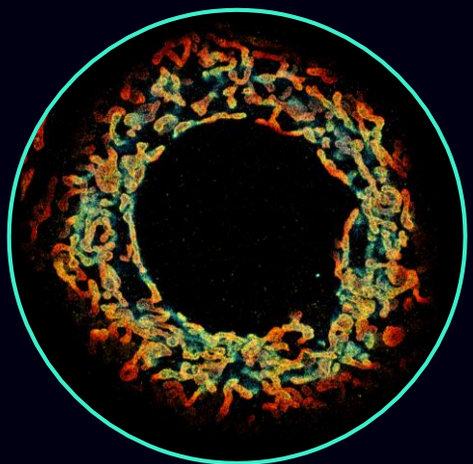


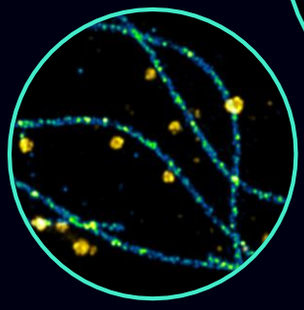
Microbiology











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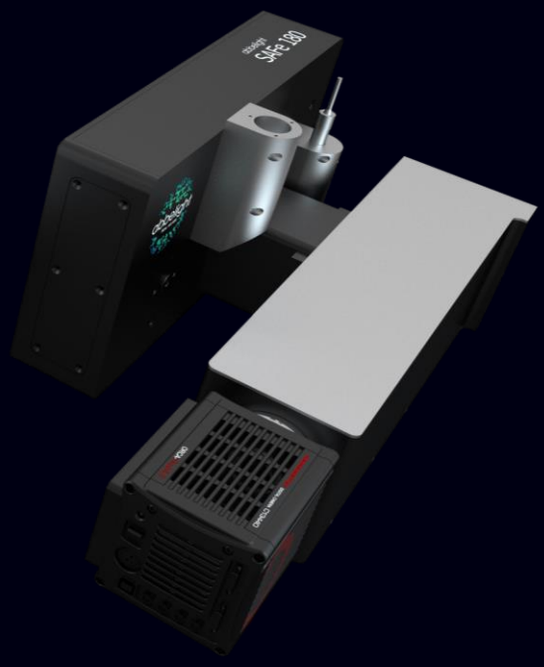
abbelight instruments

SAFe 180 module accessible nanoscopy

SAFe 180 for 2D multicolor single-molecule imaging with **10 nm** localization precision over the largest field of view of the market with **abbelight SAFe Light** technology.

- Super-resolution imaging modes: PALM, STORM, Single-Particle Tracking…
- Illumination modes: Epi, HiLo, TIRF
- 10 nm x 10 nm localization precision
- The largest homogeneous 2D field of view 150 x 150 µm²
- Low power laser needed thanks to abbelight SAFe Light technology
- Automatic switching between different illumination modes
- Fully supported by abbelight Data and abbelight Research

- *3D option: addition of an astigmatism to gain 3D information on a capture range of ~ 600 nm*



Adaptable

SAFe 180 and 360 can be adapted to any inverted microscope.

In a few minutes, you can add unique features to your existing microscopes.

Add	to your
TIRF	Confocal
PALM	Spinning-disk
STORM	Widefield
SPT	SIM
PAINT	STED

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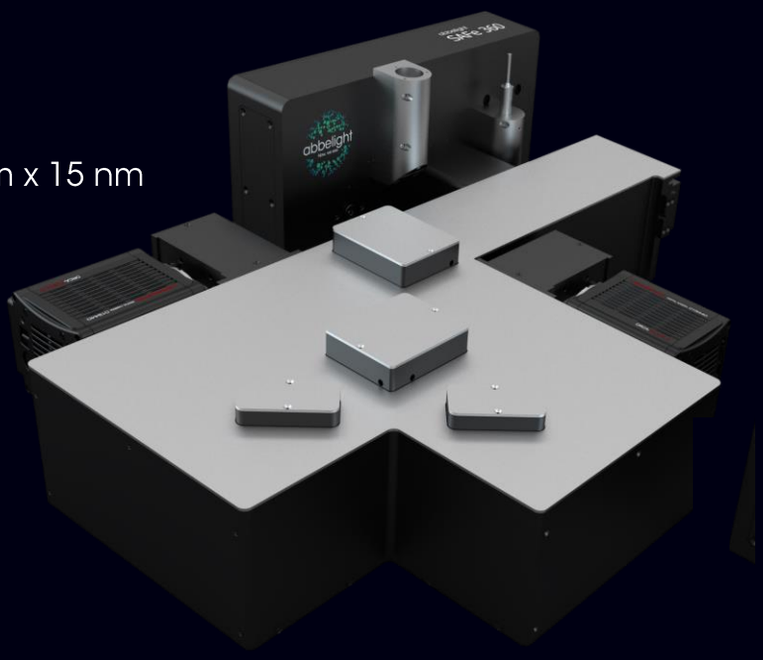
abbelight instruments

SAFe 360 module capture the evanescence

SAFe 360 to obtain 3D single-molecule information with **15 nm** localization precision **in z**, while maintaining the 10 nm localization precision in x and y.

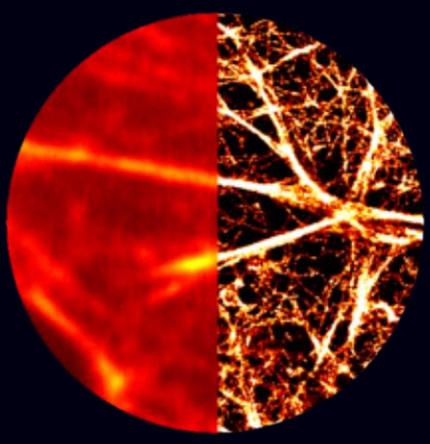
- All **SAFe 180** features

- Ultimate 3D localization precision : 10 nm x 10 nm x 15 nm
- 1 µm capture range
- 5-10 µm imaging depth
- Absolute measurement relative to the coverslip for reproducible, artefact-free measurement
- Simultaneous multicolor imaging in Epi, TIRF, or single-molecule mode
- New extra modalities for live cell imaging



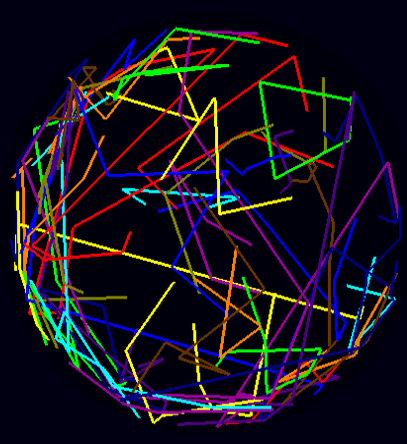
Multimodal

Fluorescence nanoscopy



Widefield / TIRF

Live imaging



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abbelight data

NEO SAFe software

NEO is abbelight's intuitive and user-friendly software. It allows the production and manipulation of 3D quantitative data. NEO software offers a complete workflow for all imaging modalities in Single Molecule Localization Microscopy: from acquisition to analysis.

Acquisition

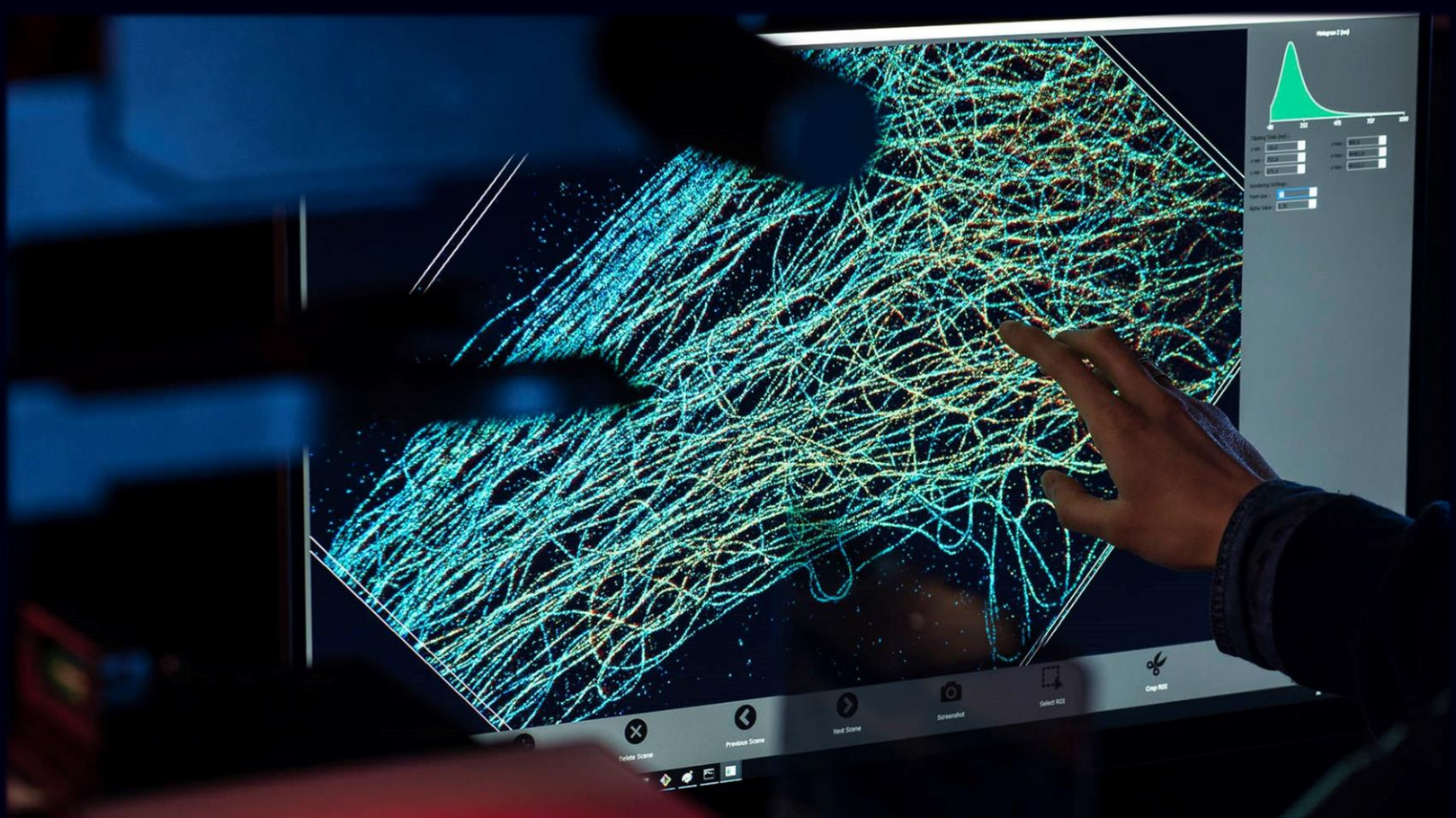
- Full instrument control
- Simultaneous multicolor imaging
- Acquisition guided by decision-making tools

Processing

- Live 3D reconstruction
- Live drift correction
- Robust, fast, efficient post-reconstruction
- State-of-the art toolbox for localization microscopy

Analysis

- Complete 3D multi-color viewer solution
- Spatial descriptive statistics
- Density-based spatial clustering
- Resolution analysis
- Single-particle tracking analysis
- Spectral demixing for multicolor imaging



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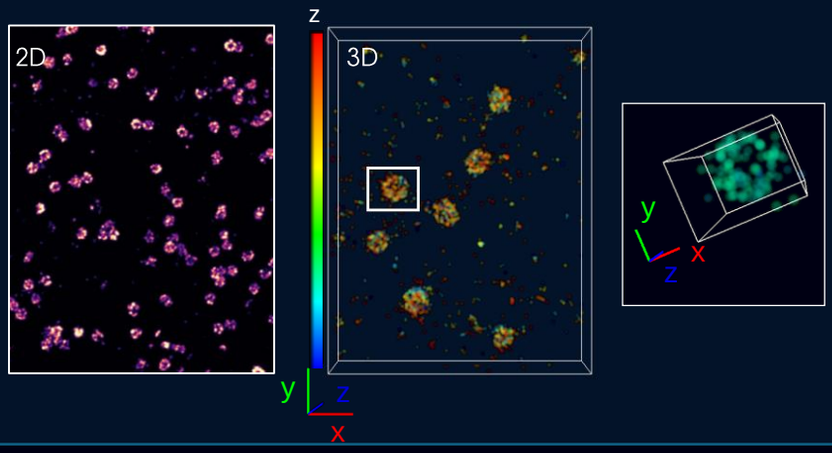
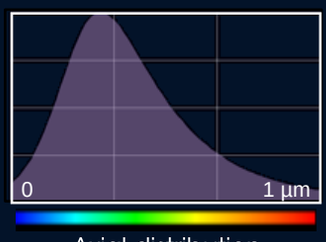
Nanoscopy data, unlike standard microscopy images, are coordinate-based rather than pixel-based, opening up new avenues for in-depth data analysis.

NEO SAFe software offers a variety of tools for nanoscopy data visualization and analysis.

3D VISUALIZATION AND DESCRIPTIVE SPATIAL STATISTICS





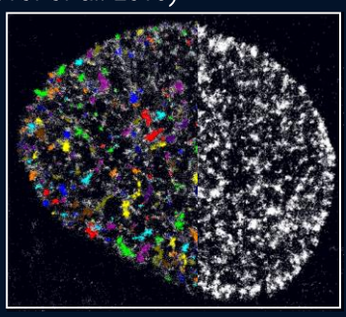
Axial distribution

	Total Dataset	ROI selected
Volume (µm³)	13.2001	0.1321
Number of localizations	3835	295
Average Density (#/µm³)	290.528	2231.784

CLUSTERING ANALYSIS

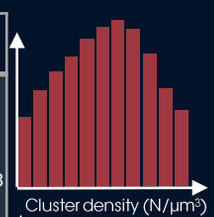
Isolation of clusters

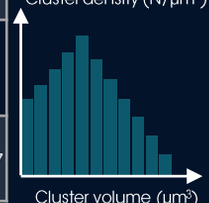
DBSCAN (Ester et al. 1996) or Voronoi segmentation (SR-Tesseller) (Levet et al. 2015)



Quantification

Clusters	1	2	3
Centroid			
X	669	654	678
Y	526	514	525
Z	0.313	0.302	0.308
(µm)			
Number of localizations	277	249	256
Volume (µm³)	0.015	0.019	0.017



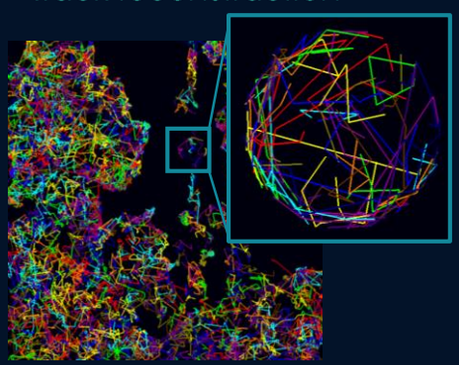


SINGLE PARTICLE TRACKING

Detection and Localization

SPT raw data are similar as standard single-molecule acquisitions, but the movement of each molecule is tracked

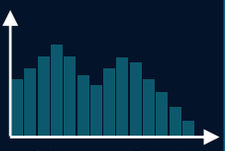
Track reconstruction



Sample provided by Dr. Chiaruttini, University of Geneva, Switzerland

Quantification

- Number of tracks
- Track duration
- Track intensity
- Diffusion coefficient based on Mean Square Displacement (MSD)

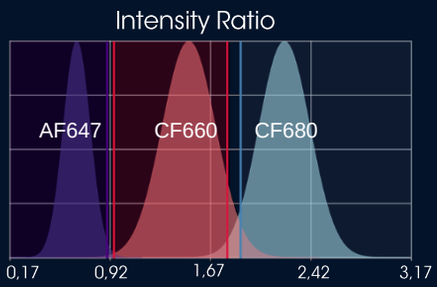


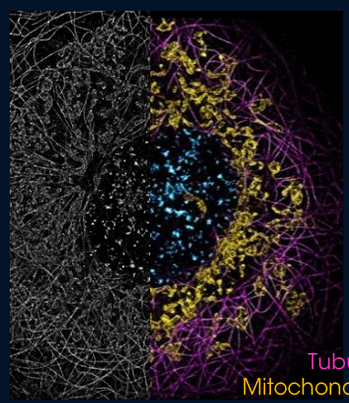
SPECTRAL DEMIXING

Multicolor with far red dyes

For each localization :

- Measurement of the intensity ratio between the 2 cameras
- Determination of the wavelength





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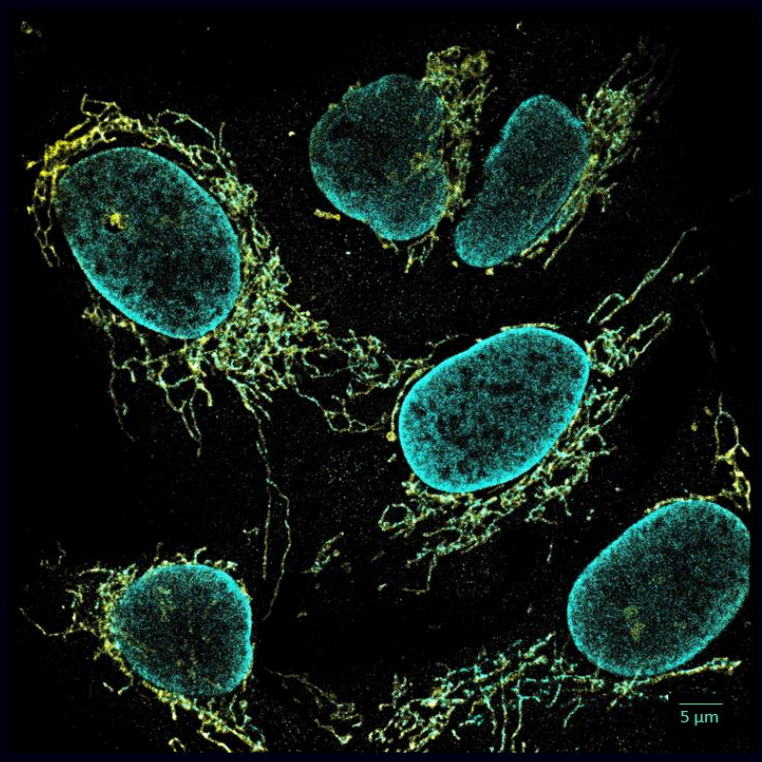
applications



DNA in mitochondria

Preparation — Fixed cells

Imaging — TOM20-AF 647
dsDNA-CF 568

Analysis — Colocalization

Prof. Yoerg Bewersdorf
Yale University School of Medicine

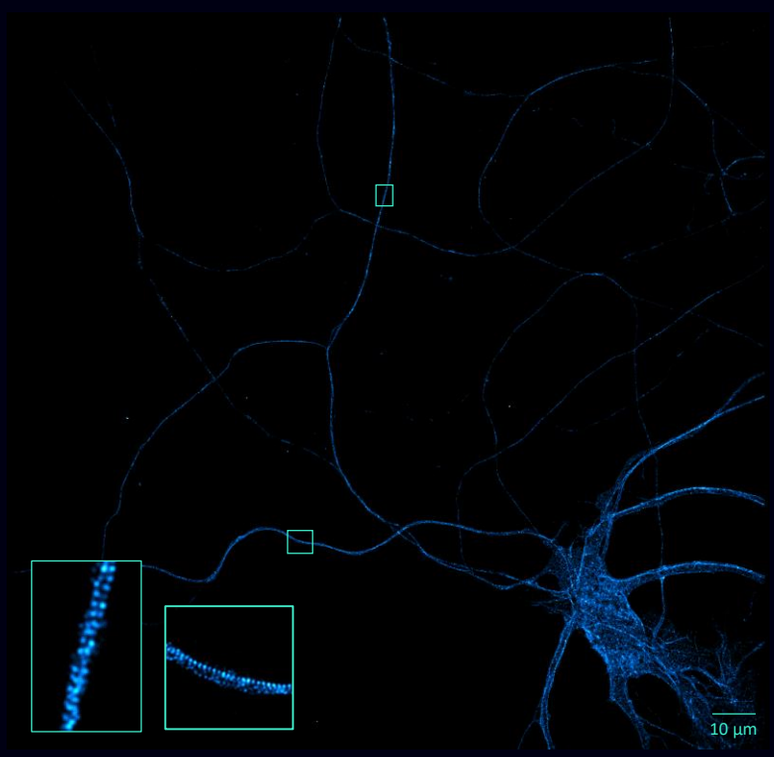
Axon nanoscale architecture

Preparation — Rat hippocampal neurons, fixed

Imaging — 3D-dSTORM
β2-spectrin - AF 647

Analysis — Nano-organisation
segmentation

Dr. Christophe Leterrier
Neurocytolab, INP
Aix-Marseille University



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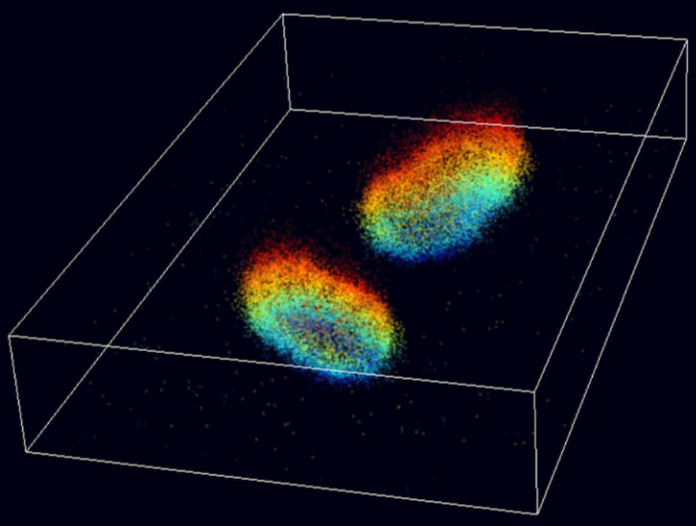
applications



Living bacteria

Preparation

Escherichia coli, live

Imaging

dual-color 3D-dSTORM
bacterial membrane and
wall - AF 647

Analysis

quantitative 3D nanometric
measures

Dr. Clément Cabriel
Sandrine Lévêque-Fort team
Institut des Sciences Moléculaires d'Orsay (ISMO)

Emerging model organisms

Preparation

Trypanosoma brucei, fixed

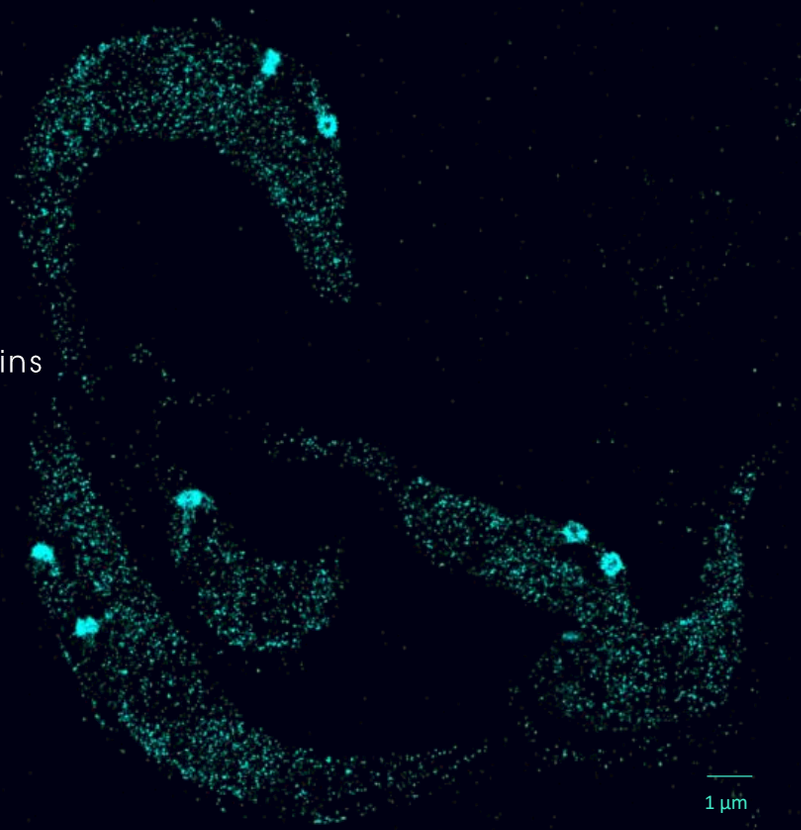
Imaging

dual-color 3D-dSTORM
intra-flagellar transport proteins
AF 647

Analysis

DBSCAN,
Voronoi clustering

Dr. Jamin Jung
Trypanosome Cell Biology
Pasteur Institute



abbelight research
SAFe hands-on nanoscopy workshop

A 3-full day course on single-molecule localization microscopy combining theory, round tables, practice on SAFe instrument and image analysis on NEO software.

Organized on-site, this workshop is tailored to your needs and adapted to both experts and neophytes to launch as many new projects as possible.

TEST
your own samples with abbelight technology

LEARN
how to optimize sample preparation, image acquisition and analysis

LAUNCH
your new nanoscopy projects

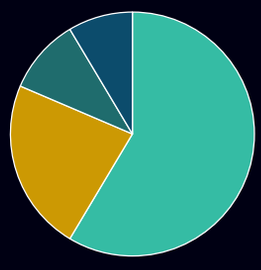
“Very fast and user friendly;
Very nice software, easy to use and easy to manage;
It is a good instrument to see fine details and the nano-organization of the cytoskeleton, of neurons and bacteria, at least this is what we saw live during the workshop.”

Italian Institute of Technology, Genoa
40 participants

“ Before the demo, the data analysis and the reconstruction was quite of a "black box" to me (at least the way the software reconstructs the images after the acquisition). Now everything is much clearer. Thanks so much! ”

Rennes, France
10 participants

Will you use 3D nanoscopy in your future research?



- Yes, in the upcoming months
- Yes, as soon as possible
- I do not know
- No

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Comparing micro and nanoscopy

	Microscopy market Compilation of the best features of the best optical microscopes	**Nanoscopy market** Compilation of the best features of the best single-molecule instruments	**abbelight SAFe 180**	**abbelight SAFe 360**	
Localization precision xyz (nm^3)	N.A. (Lateral resolution : 120-150 nm)	10*10*25	10*10*25	10*10*15	HARDWARE
Method for 3D	Z- stack	Astigmatism	Astigmatism	Astigmatism & super-critical angle fluorescence	
Parameters affecting lateral resolution (other than sample prep)	--	Illumination heterogeneity, lateral drift	None (homogeneous illumination) & Cross-correlation	None (homogeneous illumination) & Cross-correlation	
Field of view (μm^2)	150*150	50*50	150*150	150*150	
Multicolor imaging	Simultaneous multicolor imaging	Simultaneous multicolor imaging	4 colors sequentially	Simultaneous multicolor imaging (spectral demixing)	
Excitation modality	Scanning	Epi, TIRF, Hilo	Epi, TIRF, Hilo	Epi, TIRF, Hilo	
Standard imaging modalities	FRAP, FRET	PALM, STORM, SPT, TIRF	PALM, STORM, SPT, TIRF	PALM, STORM, SPT, TIRF	
Capture range (µm)	N.A	0,6	0,6	1	
Depth of imaging (µm)	> 25	5-10	5-10	5-10	
Laser power needed for the largest FOV	< 10 mW	> 1000 mW	< 300 mW	< 300 mW	
Acquisition duration	10 ms	Seconds to minutes	Seconds to minutes	Seconds to minutes	
Compatibility with existing systems	--	--	Confocal, Spinning Disk, Widefield, SIM, STED …	Confocal, Spinning Disk, Widefield, SIM, STED …	
Time to 2D & 3D reconstructed image Drift corrected –largest FOV	Real-time	Real-time	Real-time	Real-time	SOFTWARE
Live cell imaging	Video Microscopy LSM Spinning disk	Live SIM Live SPT	Video Microscopy (TIRF, EPI, Hilo) Live SPT	Video Microscopy (TIRF, EPI, Hilo) Live SPT	
Nanoscale Data analysis	--	3D visualization SPT analysis Clustering	3D viewer Clustering SPT analysis	3D viewer Clustering SPT analysis Spectral Demixing	
Scientific support	--	--	SAFe accelerator Abbelight academy - Online tutorials	SAFe accelerator Abbelight academy - Online tutorials	SERVICES
Super-resolution buffer & samples	--	--	Smart KIT Blinking Pad Calibration samples	Smart KIT Blinking Pad Calibration samples	

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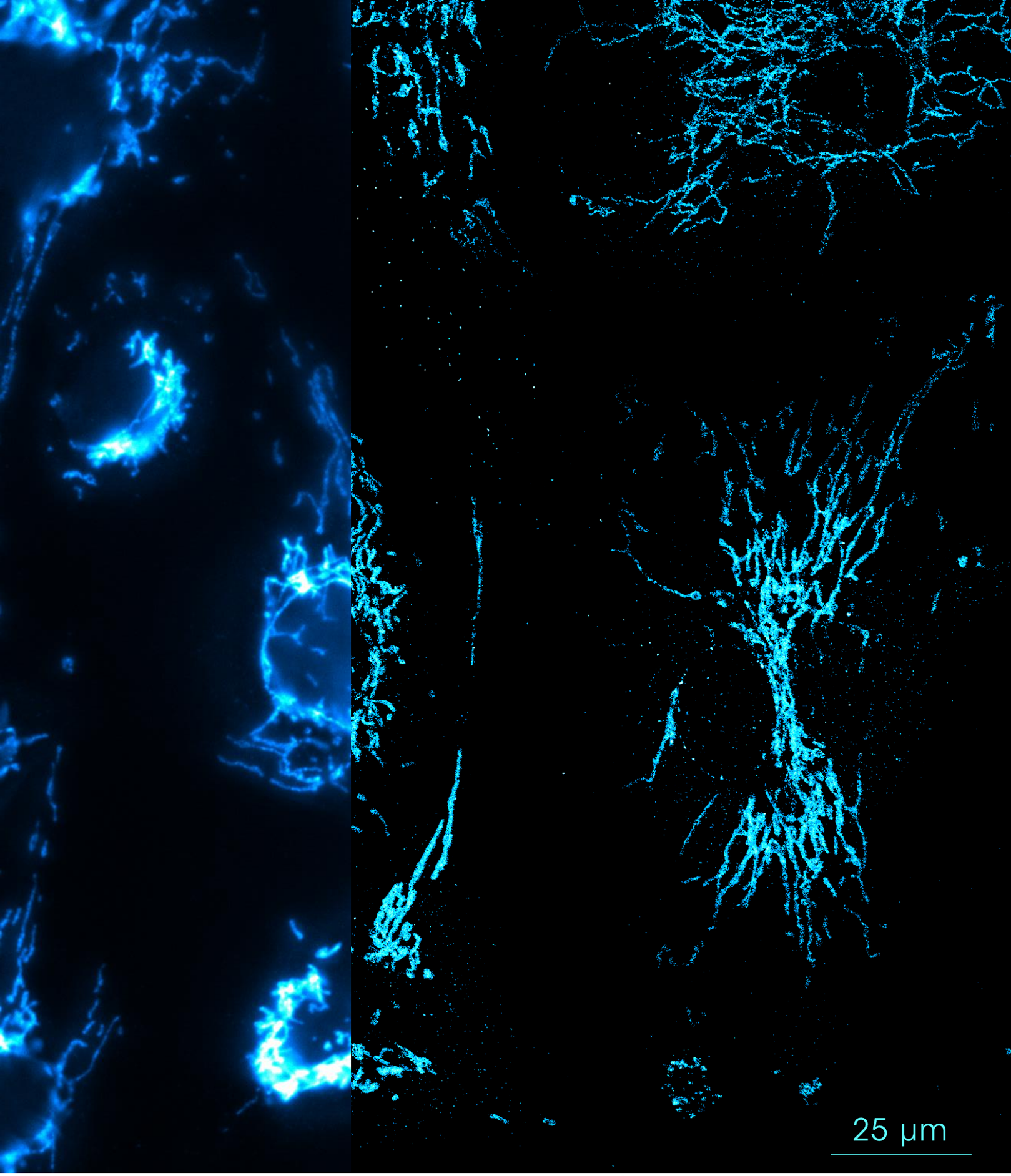

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191 avenue Aristide Briand
94230 Cachan, France

DANGER-VISIBLE AND INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION CLASS 4 LASER PRODUCT
Total Power 1500 mW MAX
CW 400-700 nm
IEC/EN60825-1: 2014

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice n°50, dated June 24, 2007