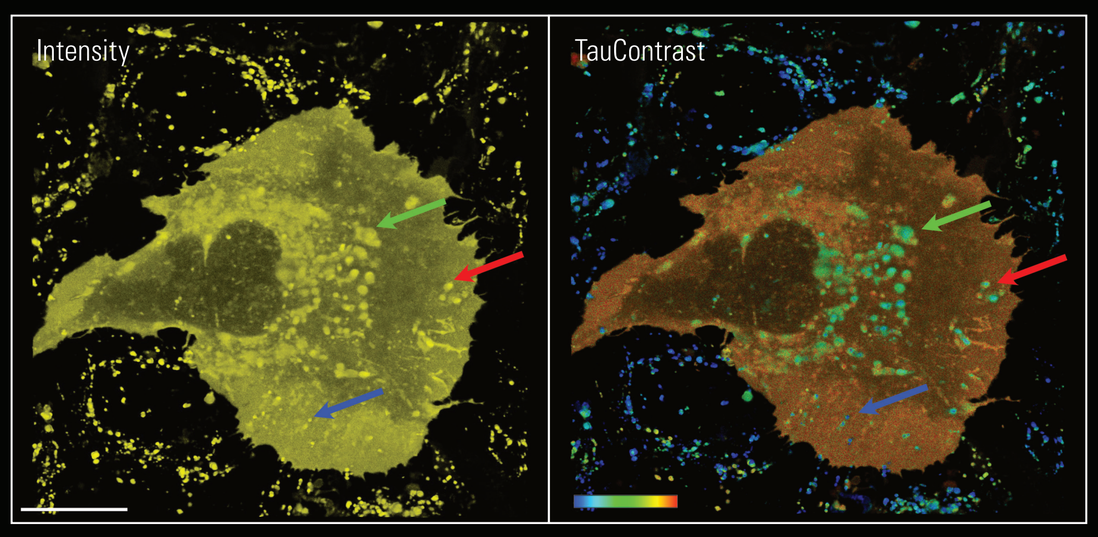
Leica MICROSYSTEMS

STELLARIS
CONFOCAL RE-IMAGINED

Exploring the Potential of TauSense

TauSense is a set of imaging tools that provides you with a straightforward way to generate images using fluorescence lifetime based information.
Explore the potential of the different TauSense tools for your research.

Applying TauContrast to access to functional insights: Monitoring the pH response of the internalized CellBrite NIR790.

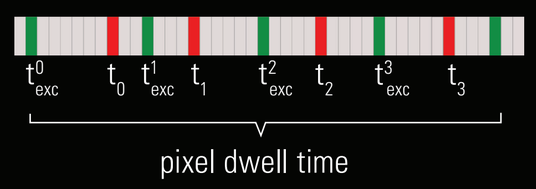


CellBrite NIR790 membrane labeling in living HeLa cells. The pH response of the internalized probe in lysosomes is monitored using TauContrast. Scale bar: 2 µm.
Rainbow LUT (TauContrast): 0-4 ns.

STELLARIS acquires Fluorescence Intensity (Nphotons) and Photon Arrival Times (ns) Simultaneously, resulting in a Average Arrival Time (AAT) image on the fly. The calculations below depict

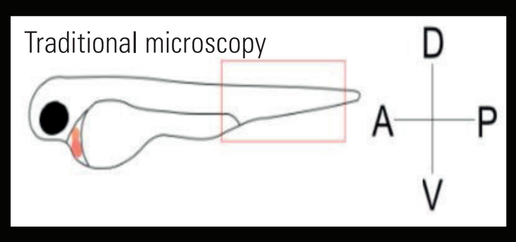
$$AT_i = t_i - t^i_{exc} \longrightarrow AAT = \frac{\sum_i^N AT_i}{N}$$

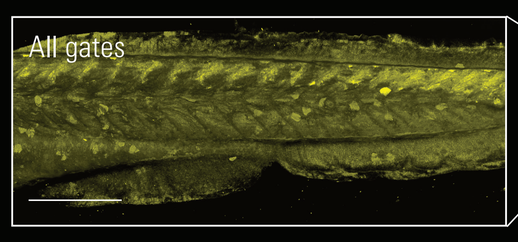
Average Arrival Time (AAT) in a pixel

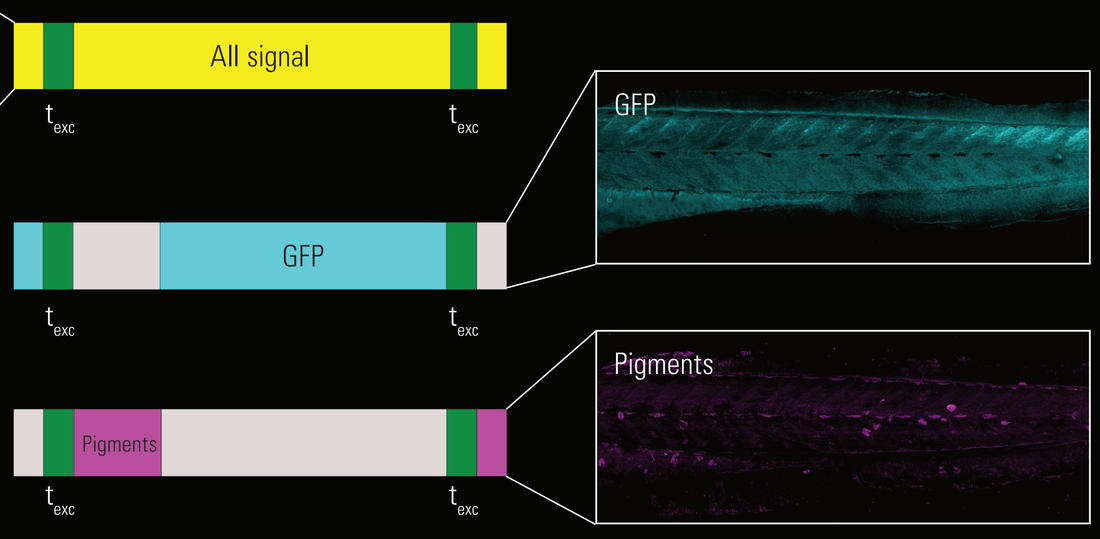


AT_i = arrival time photon *i*
t^i = time of the arrival of photon *i*
t^i_{exc} = time of the excitation pulse *i*
N = number of photons detected during the pixel dwell time

Improving image quality with TauGating: Splitting the contribution of endogenous pigments and GFP signal.



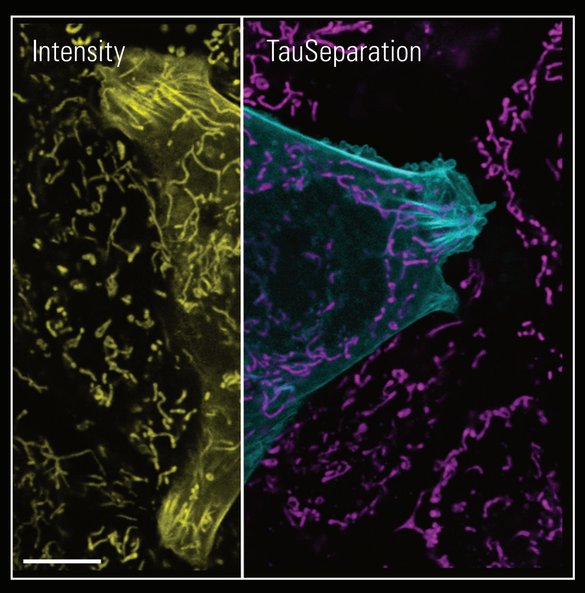




TauGating separates the undesired signal from endogenous pigment contributions (magenta, short ATs) by counting only the photons arriving during the selected time gates. This way we obtain a clean signal of interest (cyan, long ATs) Scale bar: 200 µm.
(Sample courtesy: Julien Vermot, IGBMC, Strasbourg).

Zebrafish of the 4xGTIIC:d2GFP line still containing their native pigments. GFP signal provides a readout of Yap1/Taz-Tead activity and is used here to visualize the striated muscle of the trunk.

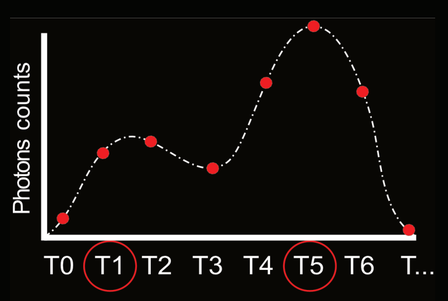
TauScan and TauSeparation allow lifetime-based multiplexing beyond the spectral options with TauSeparation: Separating dyes with overlapping spectra.

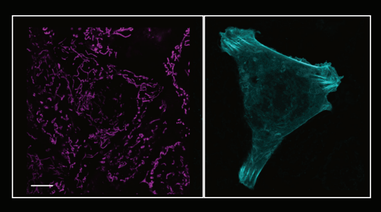


STELLARIS acquires Fluorescence Intensity (Nphotons) and Photon Arrival Times (ns) simultaneously that results in gate-based multi-components graphs. Images can be then separated by selecting the respresenative fluorescent lifetime components

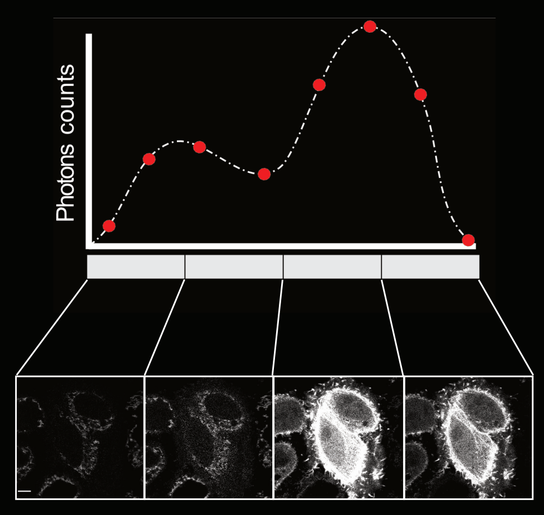
Life-Act GFP (ibidi GmbH) and MitoTrackerGreen were separated in live cells using their different lifetime components. Scale bar: 10 µm.

TauSeparation





TauScan



Reference
Roberti et al, TauSense: a fluorescence lifetime-based tool set for everyday imaging, Nature Methods Sep 2020
https://www.nature.com/articles/d42473-020-00364-w

www.leica-microsystems.com/products/confocal-microscopes

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