SP8 New Electronics
Benefits for applications

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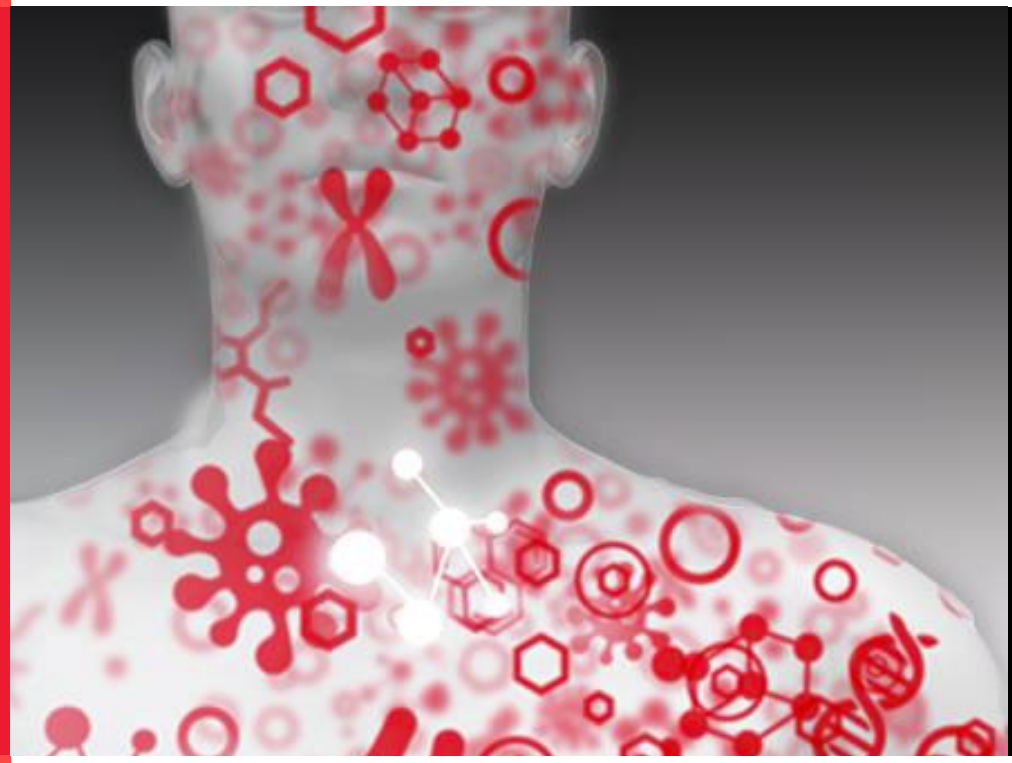
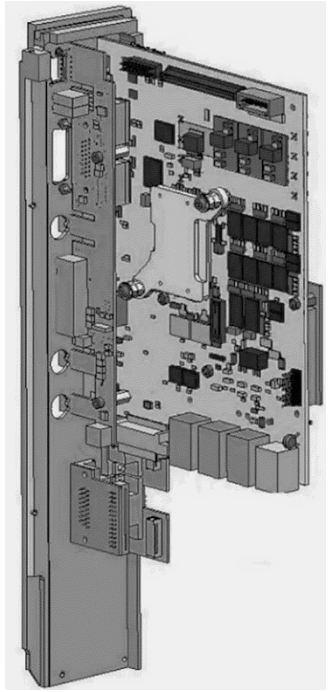


From Eye to Insight

The New SP8 Electronics

- linear scan with 85% duty cycle
- in unidirectional mode: asymmetrical linear scan
- for conventional scanner linear and sine
- resonant scanner always moves sinusoidal
- increased bandwith: more channels @ formats



New Leica Electronics - Specifications

- LAS X => 3.5.0 supports linear scanning with maximum duty cycles of 85%
  - - Uni-directional linear scan from 1Hz to 1800Hz
  - - Bi-directional scan from 1Hz to 600Hz

- Linearization of resonant Galvo?

  The nature of a resonant oscillation is basically a sinusoidal movement.

  We are not going to move the resonant galvos linearly!

starting with S/N 8110xxxxxx

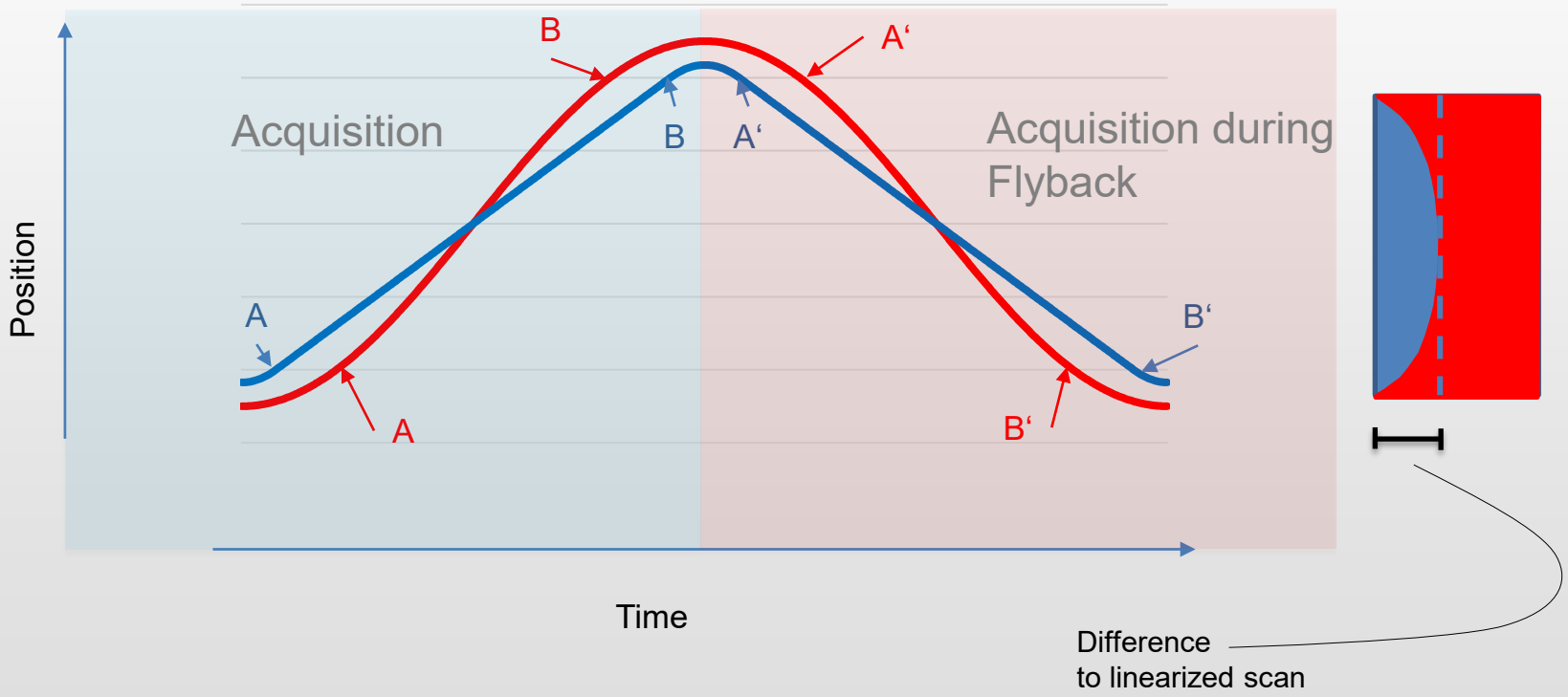
New Leica Electronics - Specifications

- more computation power
- faster:
  - 80MHz analog-digital conversion
    => max 1664 Pixel/line @12kHz
    => max 2496 Pixel/line @8kHz
- more channels simultaneously
  e.g. 4 HyD + 3 PMT, bidir, 512x512 @8kHz

- Examples for increased bandwidth:

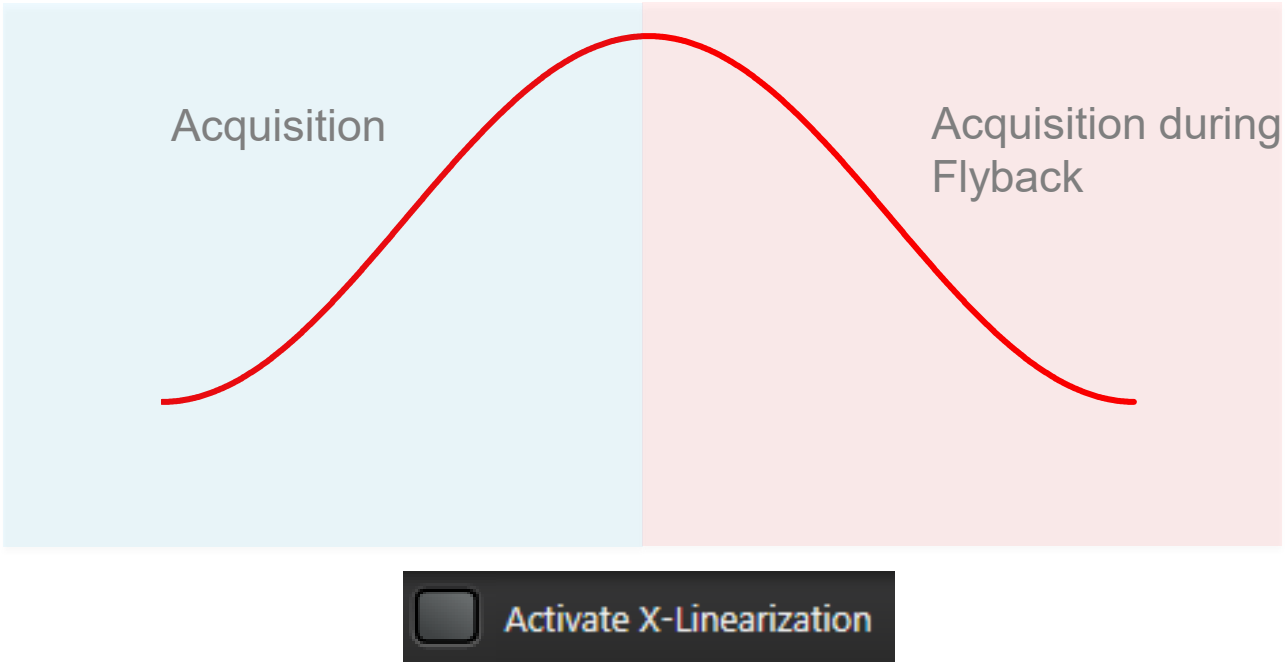
New Electronics	Previous Electronics
• 8kHz: 2496x2496, 3 ch, 8-bit simultaneous • 8kHz: 2496x2496, 1 ch, 16-bit • 12kHz: 1664x1664, 3 ch, 8-bit simultaneous • 12kHz: 1664x1664, 1 ch, 16-bit • 12kHz: 1024x1024, 4 ch, 8-bit simultaneous • 12kHz: 1024x1024, 2 ch, 8-bit, bi-directional simultaneous	• 8kHz: 1248x1248, 2 ch, 8-bit simultaneous • 8kHz: 1248x1248, 12-bit • 12kHz: 832x832, 2 ch, 8-bit simultaneous • 12kHz: 832x832, 12-bit • 12kHz: 416x416, 4 ch, 8-bit simultaneous • 12kHz: 832x832, 2 ch, bi-directional simultaneous

Movement of Line-Galvanometer



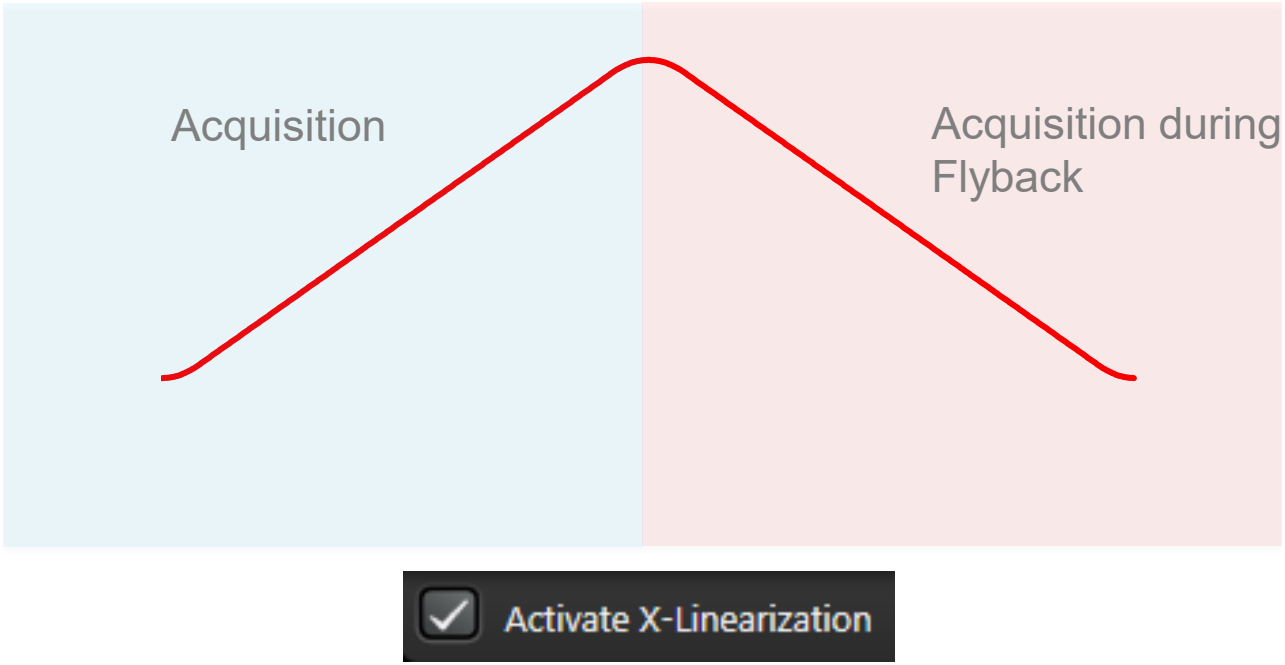
comparison sinusoidal and linear

YES,



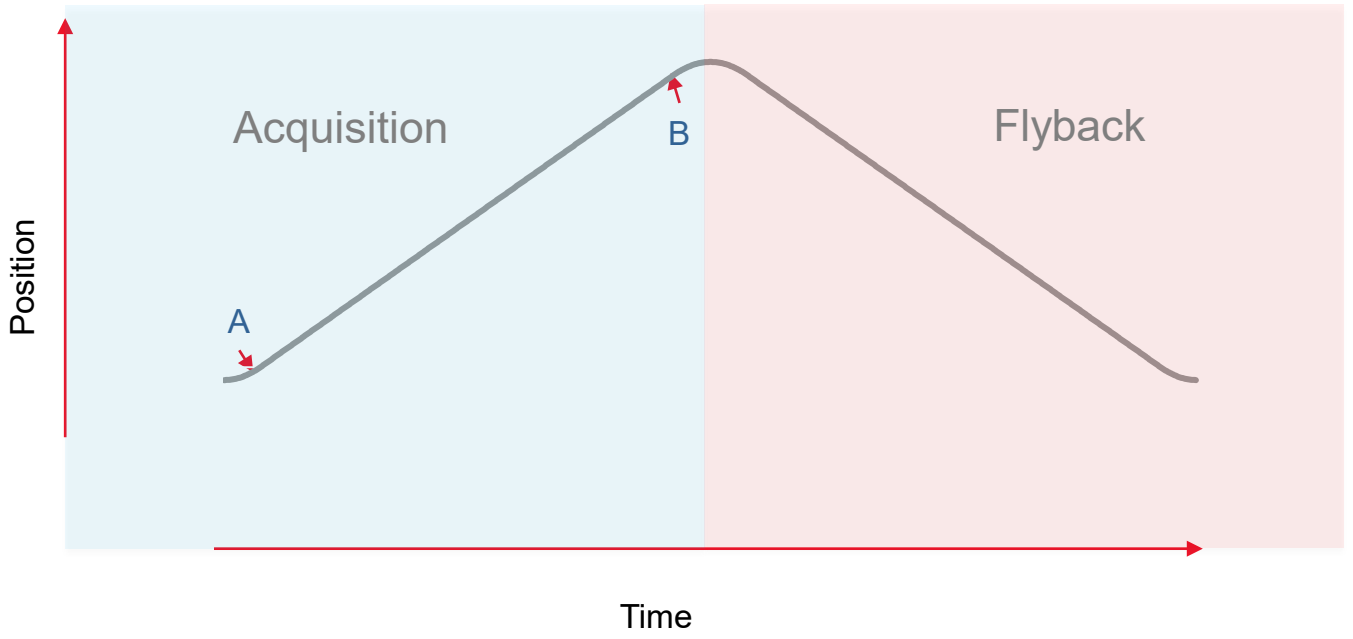
there is a new check-box!

YES, WE CAN!



85% Duty Cycle for bidirectional scanning!

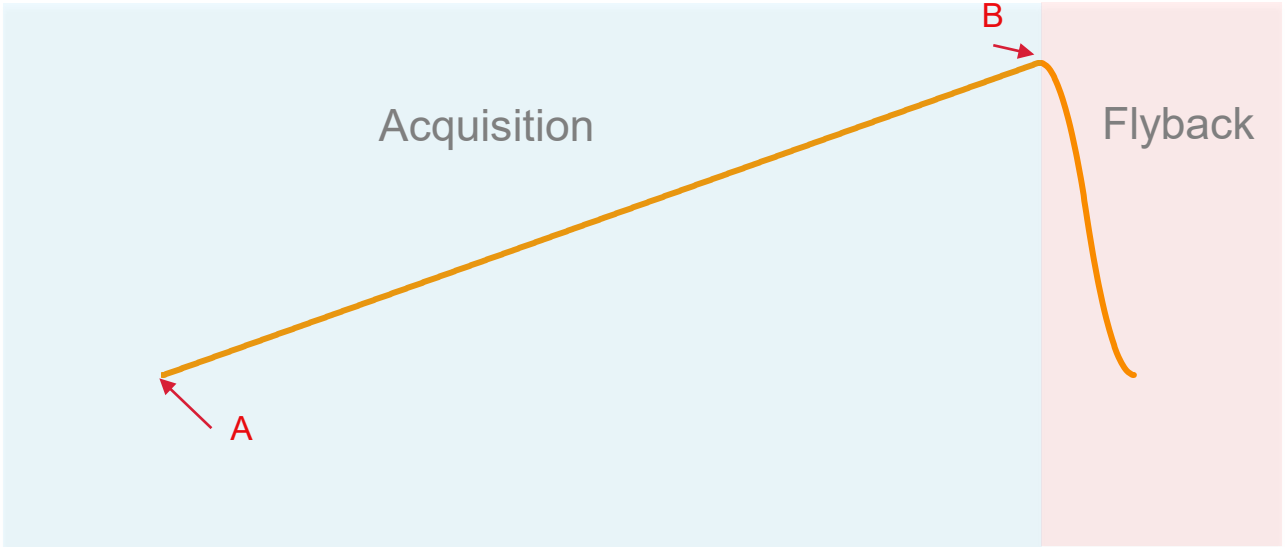
Unidirectional Scanning:



Duty Cycle only 42,5%?

Unidirectional Scanning:

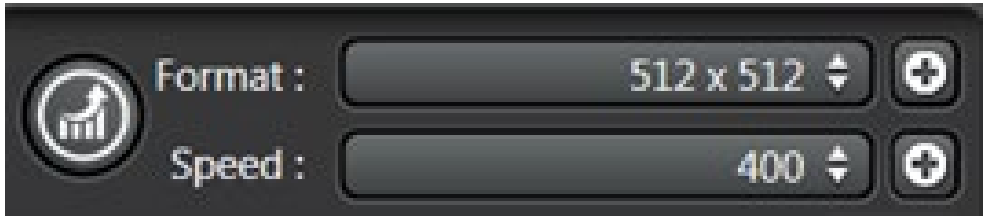
New Leica Unidirectional Asymmetric Linear Scan



> 80% Duty Cycle for unidirectional scanning < 200Hz

> 60% Duty Cycle for unidirectional scanning < 400Hz

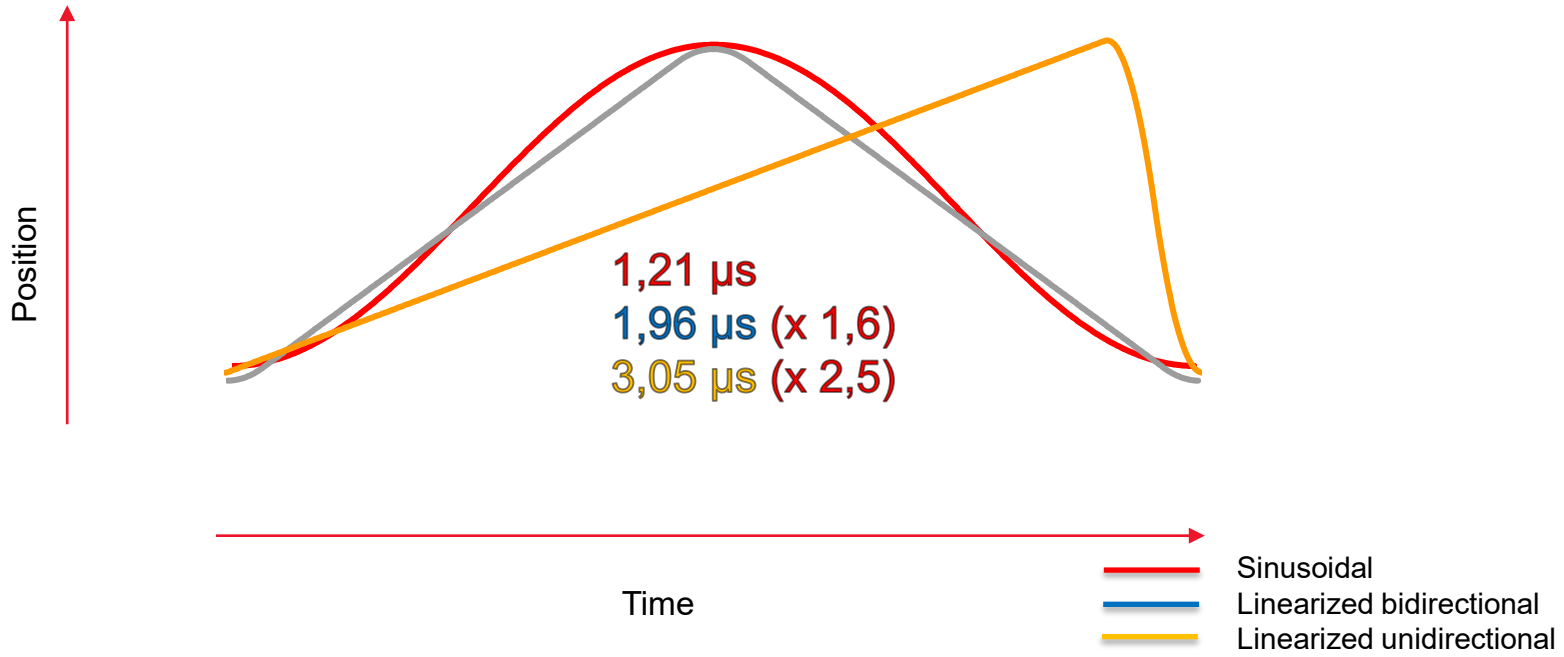
Unidirectional Scanning:



linearized scan:

2.5 times more signal, 2.5 brighter in counting mode, 58% more S/N

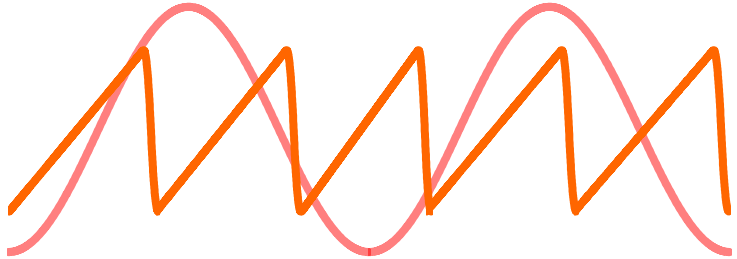
Typical Pixel Dwell Times 400Hz @ 512x512



Short Guide

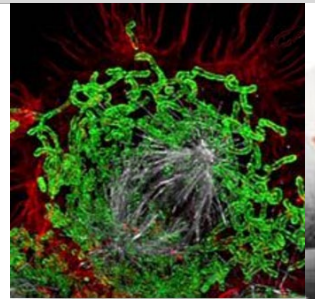
Benefits from Linear Scan to SP8 portfolio

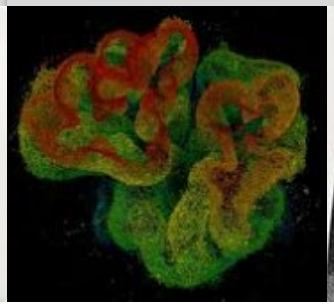
Increase Speed, SNR fixed

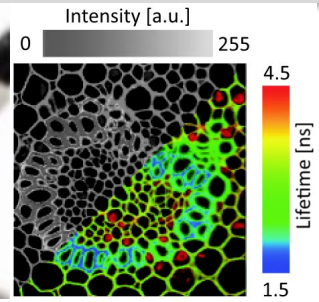


- 200 Hz scan speed – linear vs sine
- Enjoy 58% SNR increase at higher irradiation dose

- Keep same SNR – 440 Hz (linear) vs 200 Hz (sine) scan speed advantage
- Enjoy higher frame rate at same SNR and irradiation dose (faster time lapse and stacks)







- HyVolution 2
- STED
- SMD FLIM

Advantage for techniques which are gasping for SNR and/or SPEED

Linearized scan offers three different possibilities:

1) Brighter image or better SNR

Stay at the same frame rate (lines in Hz) and laser power, pixel dwell time is increased:
Enjoy brighter image in HyD photoncounting mode or better SNR in HyD standard mode and PMT.

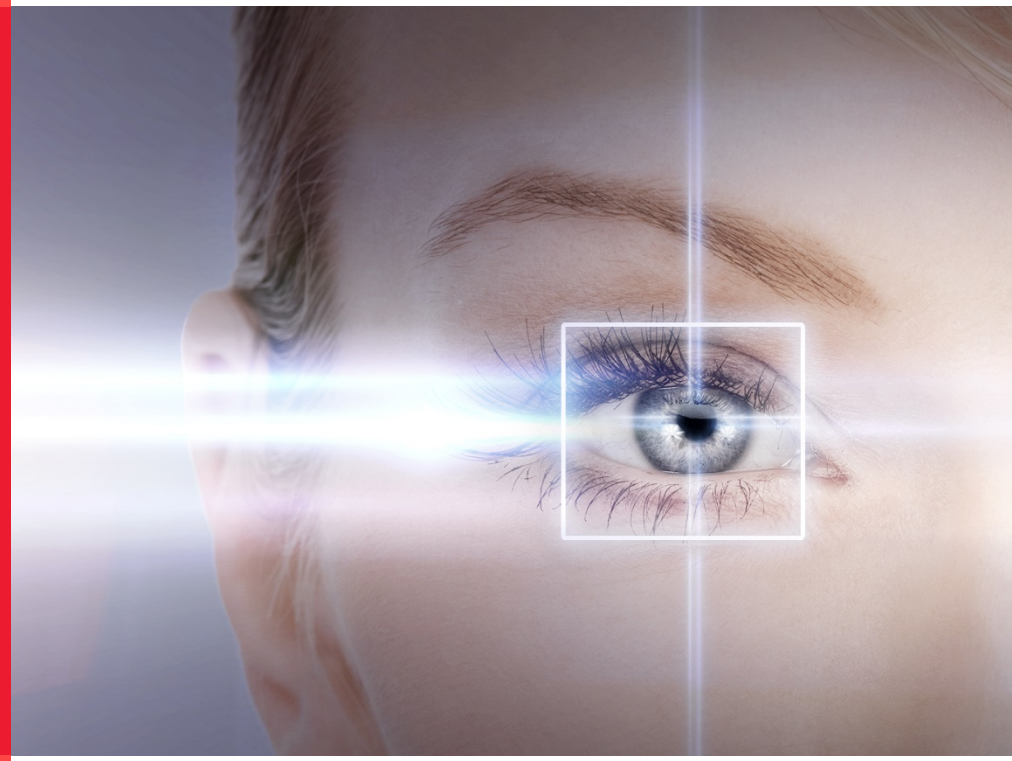
2) Less laser power

Stay at the same frame rate (lines in Hz) and same pixel dwell time, means same brightness or SNR, respectively:
Apply less laser power

3) Higher frame rate

Stay at the same pixel dwell time, means same brightness or SNR, respectively and same laser power:
Enjoy higher frame rate (lines in Hz)

Thank You!



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