Whole Spectrum Fluorescence Detection

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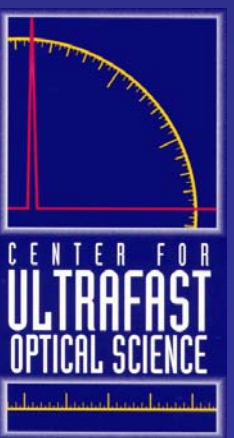
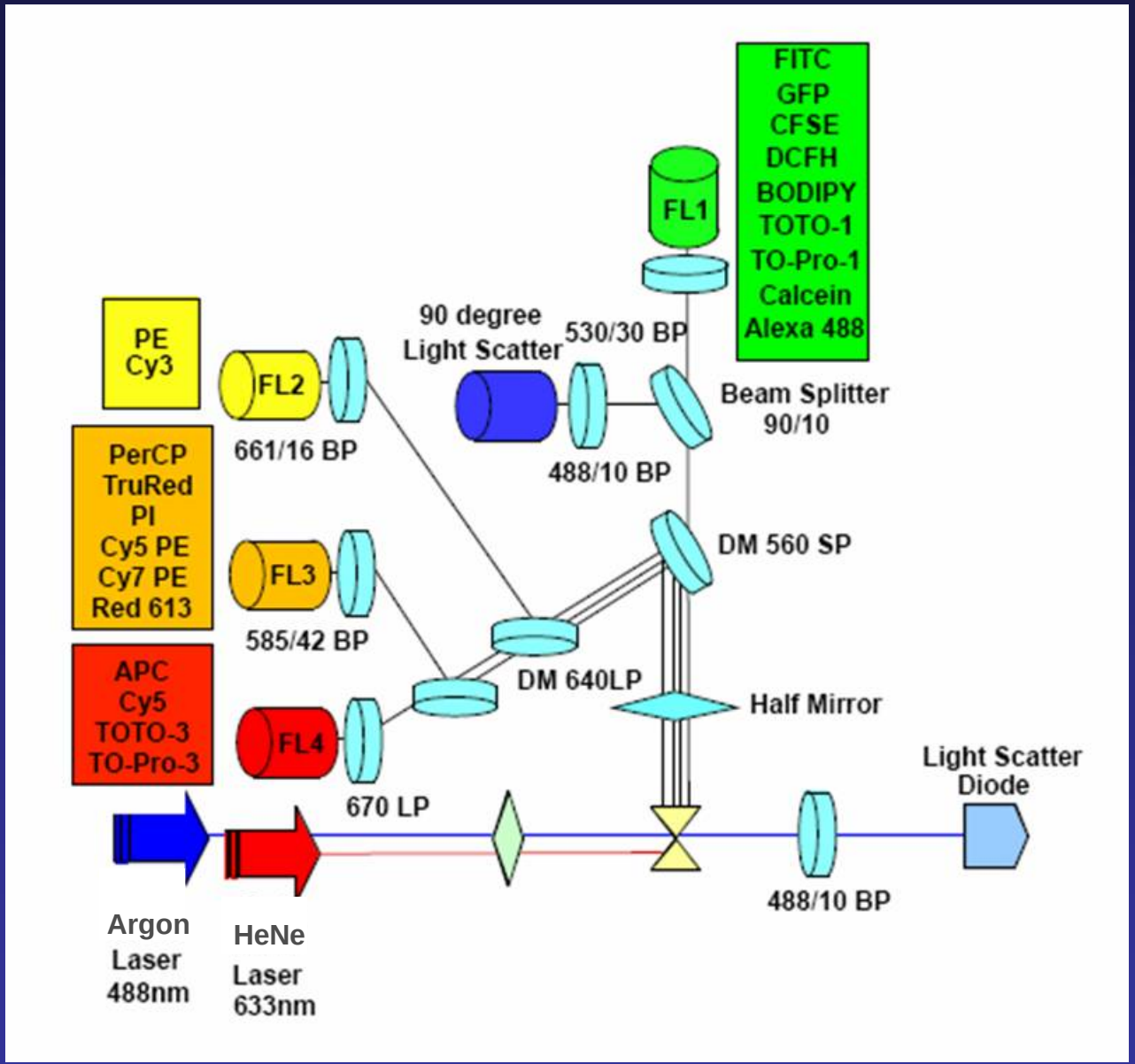




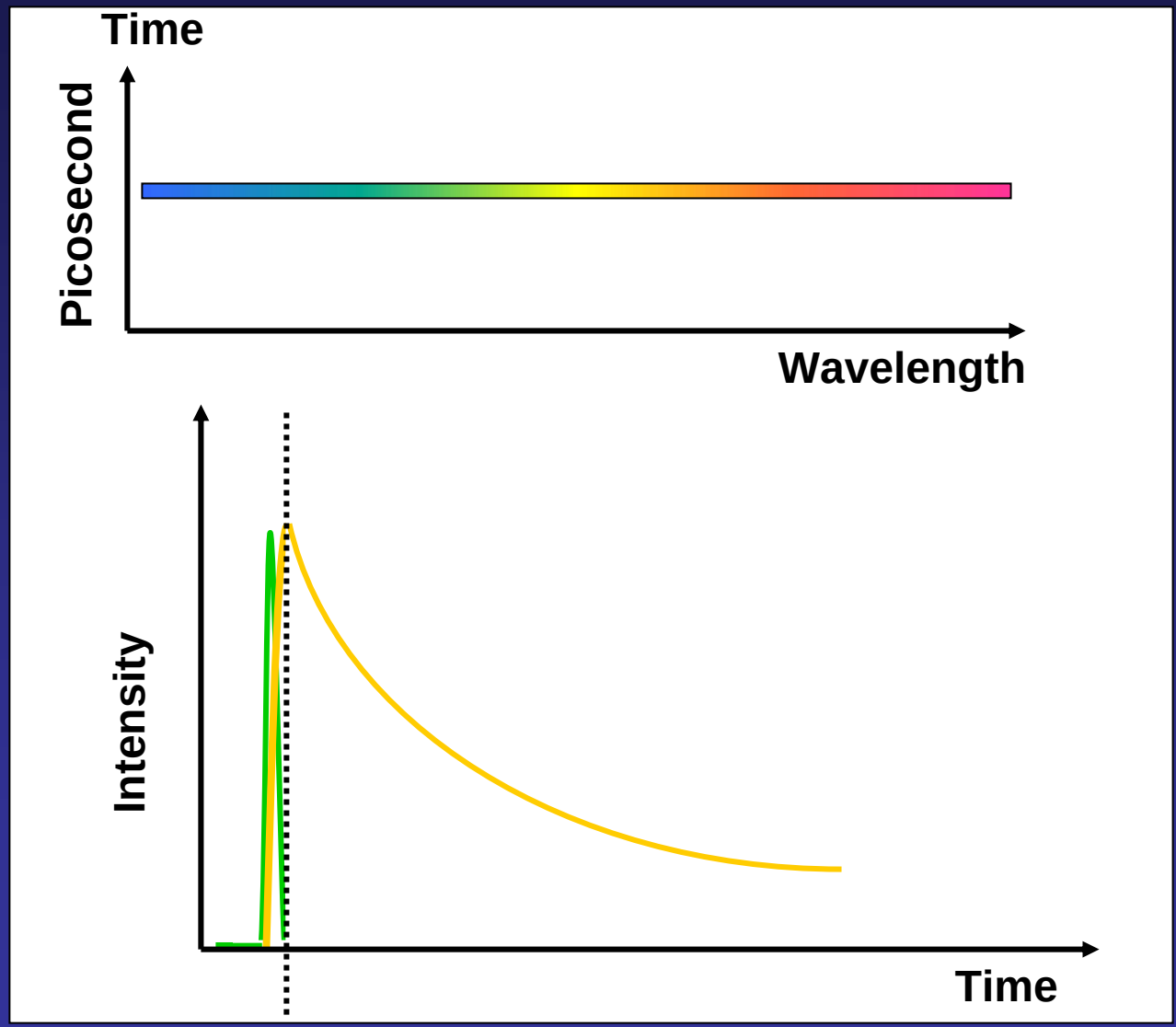
FACSCalibur (from BD Bioscience)

Our approach:

- Use a SINGLE laser source to Excite ALL fluorescent biomarkers.
- Collect ENTIRE fluorescence spectrum ranging from visible to NIR.
- Simple configuration: No bandpass filters, No dichroic mirrors

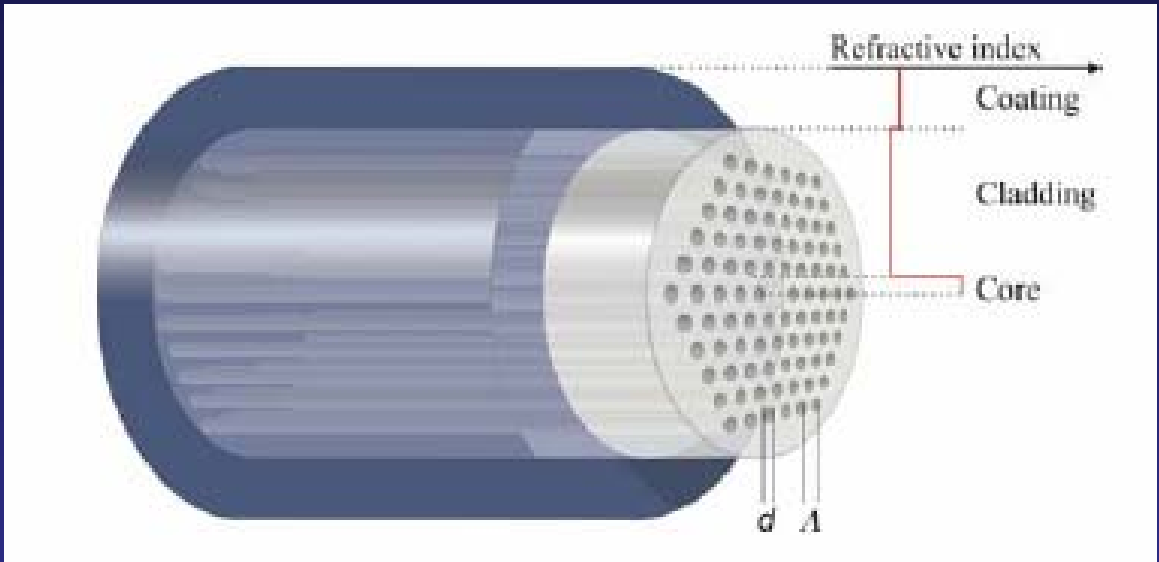
We use white light for excitation!

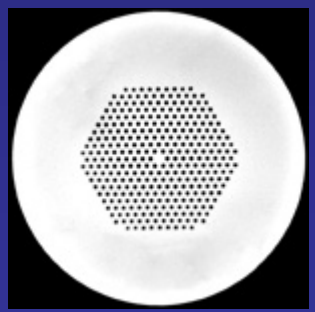
It’s white light, and it’s ultrafast!

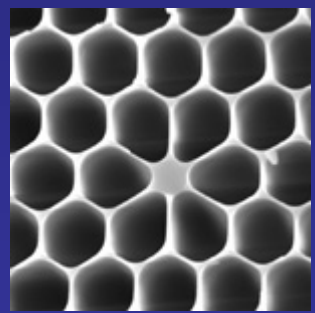


Separate fluorescence from excitation light in the time domain!

Nonlinear Photonic Crystal Fiber for Supercontinuum Generation



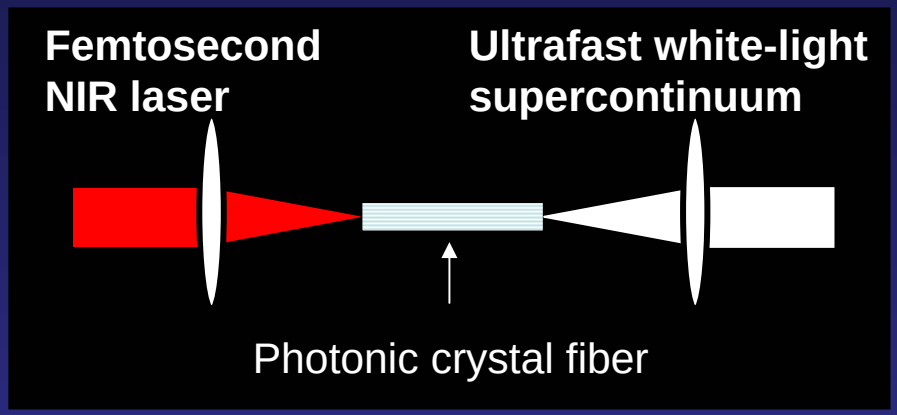


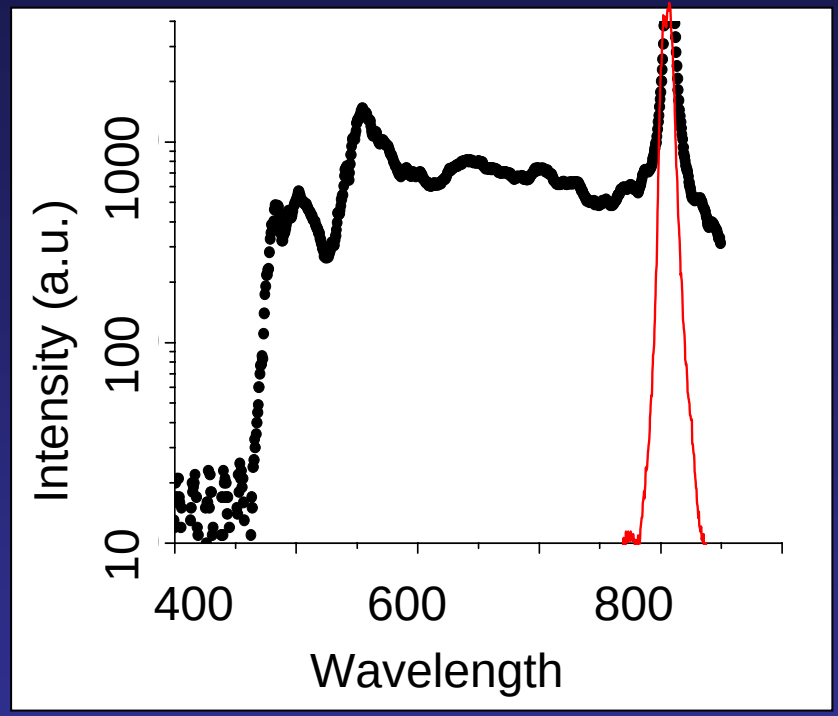


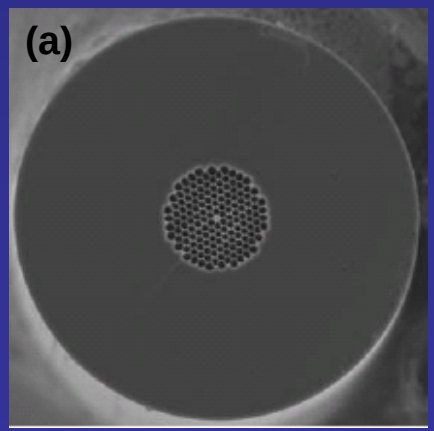
5μm

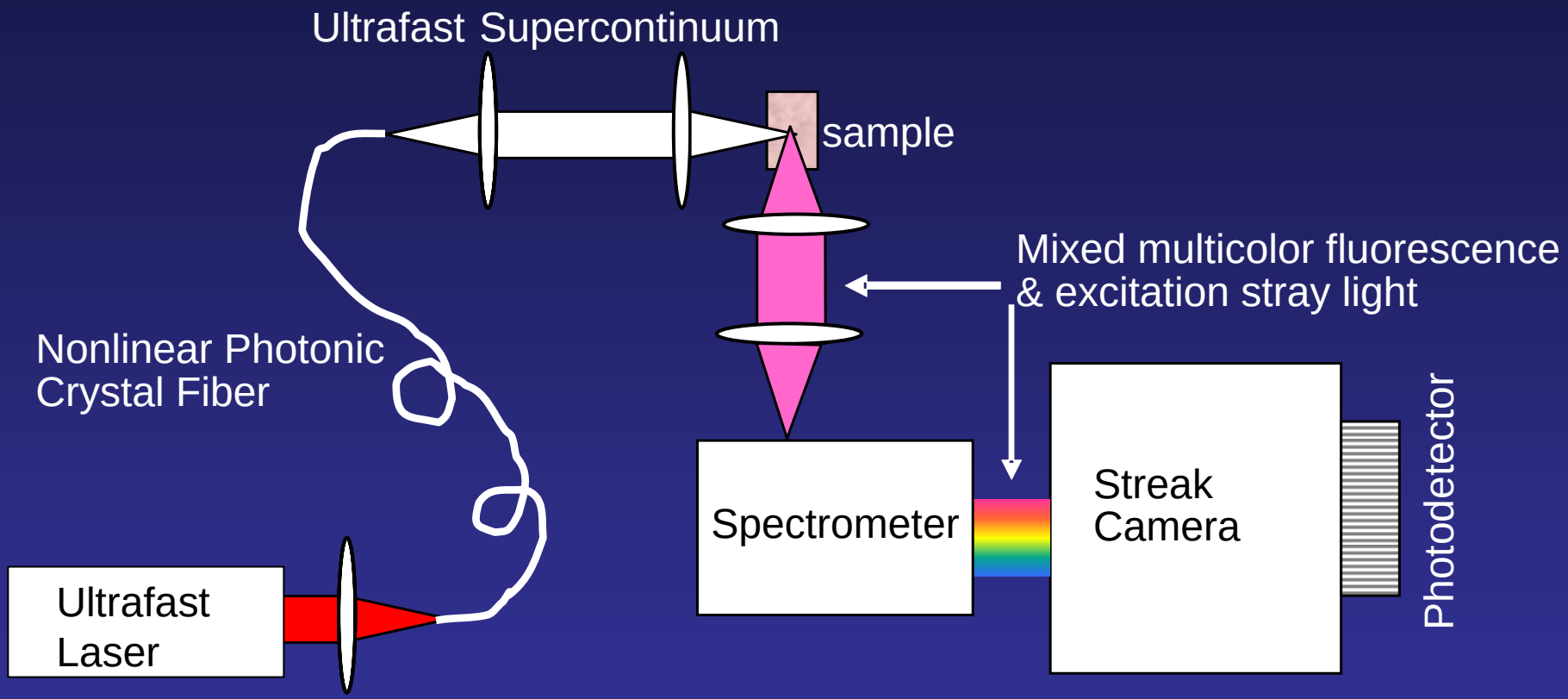
From Crystal Fiber

Generation of ultrafast white-light supercontinuum



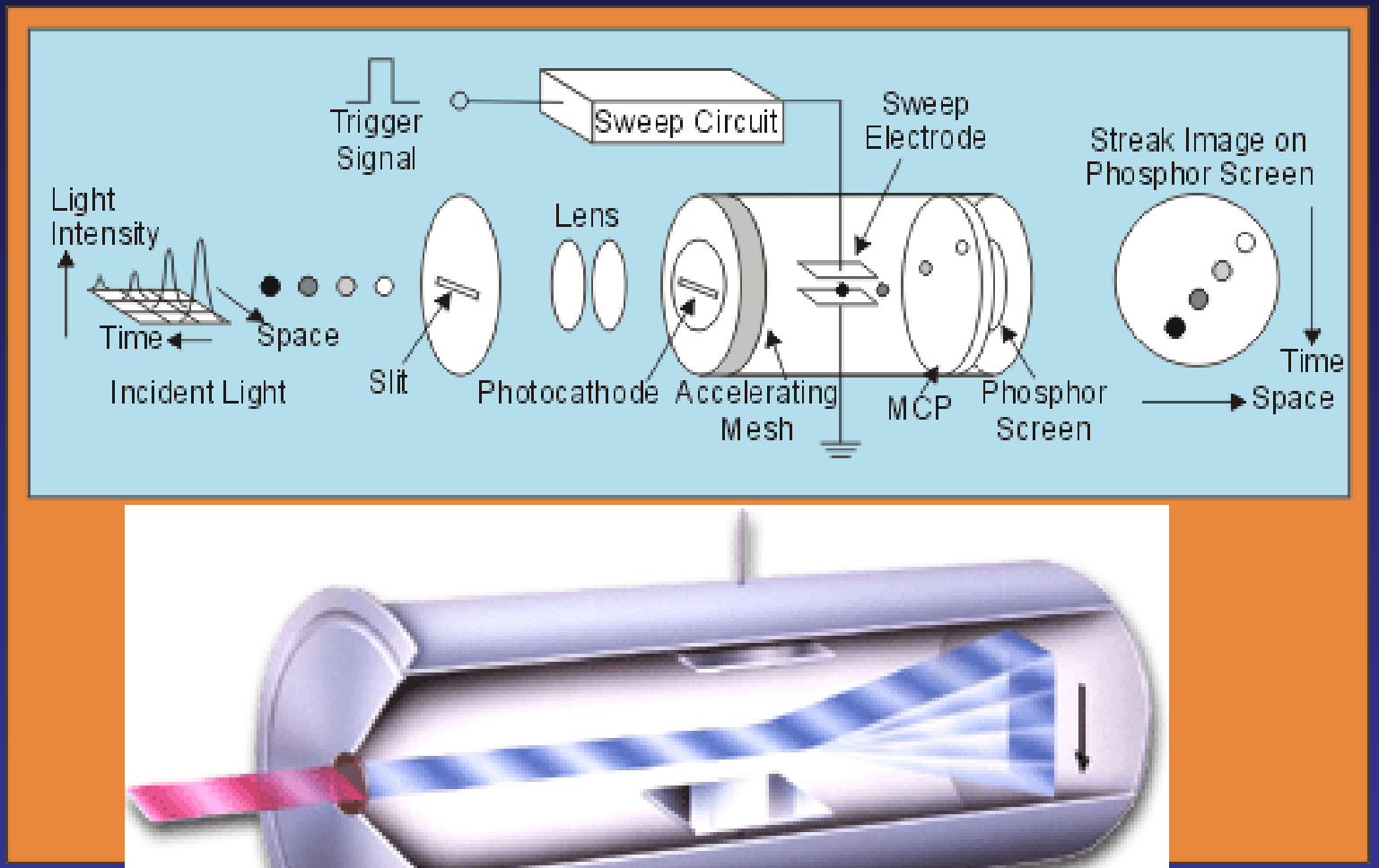




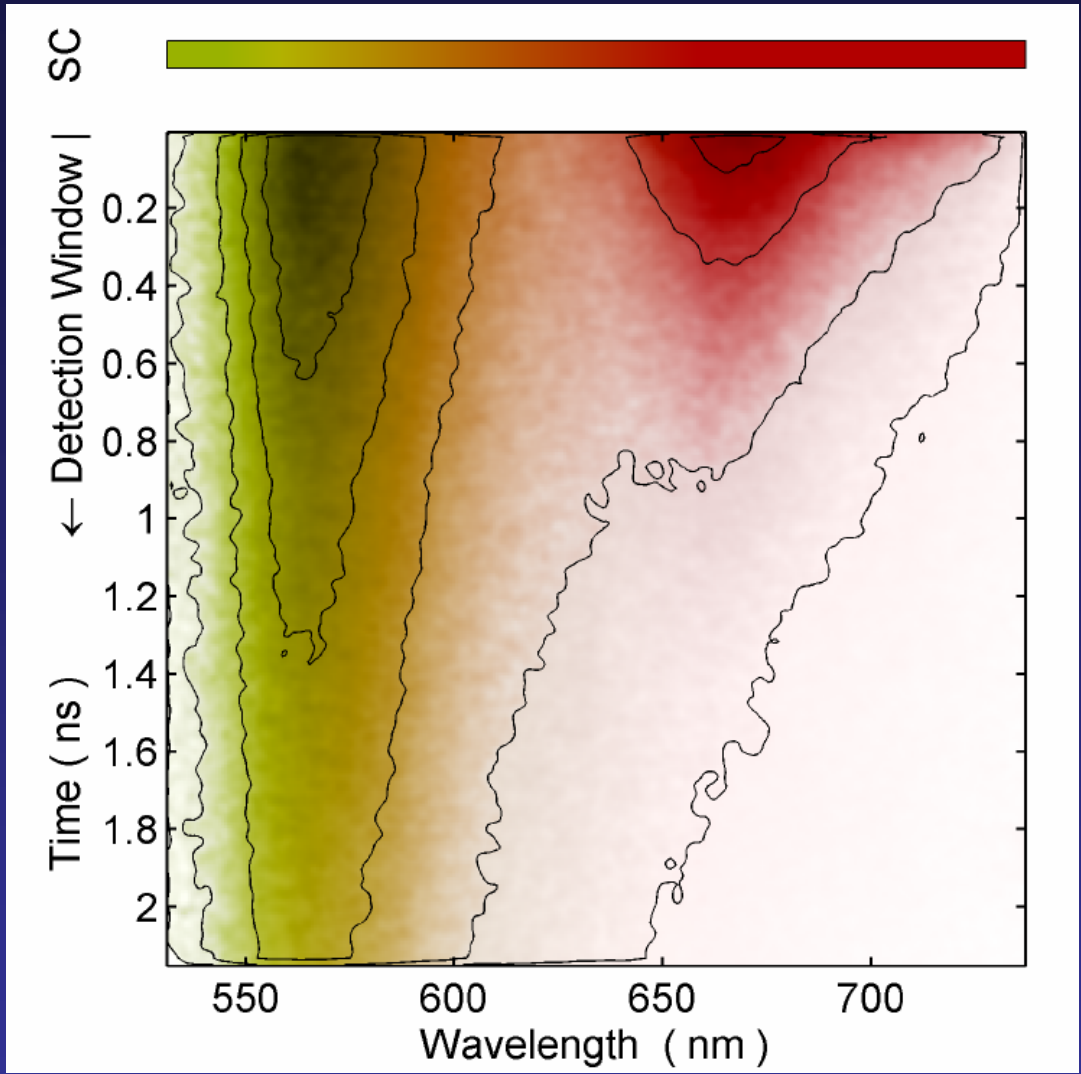


Simple configuration, and excellent capability !

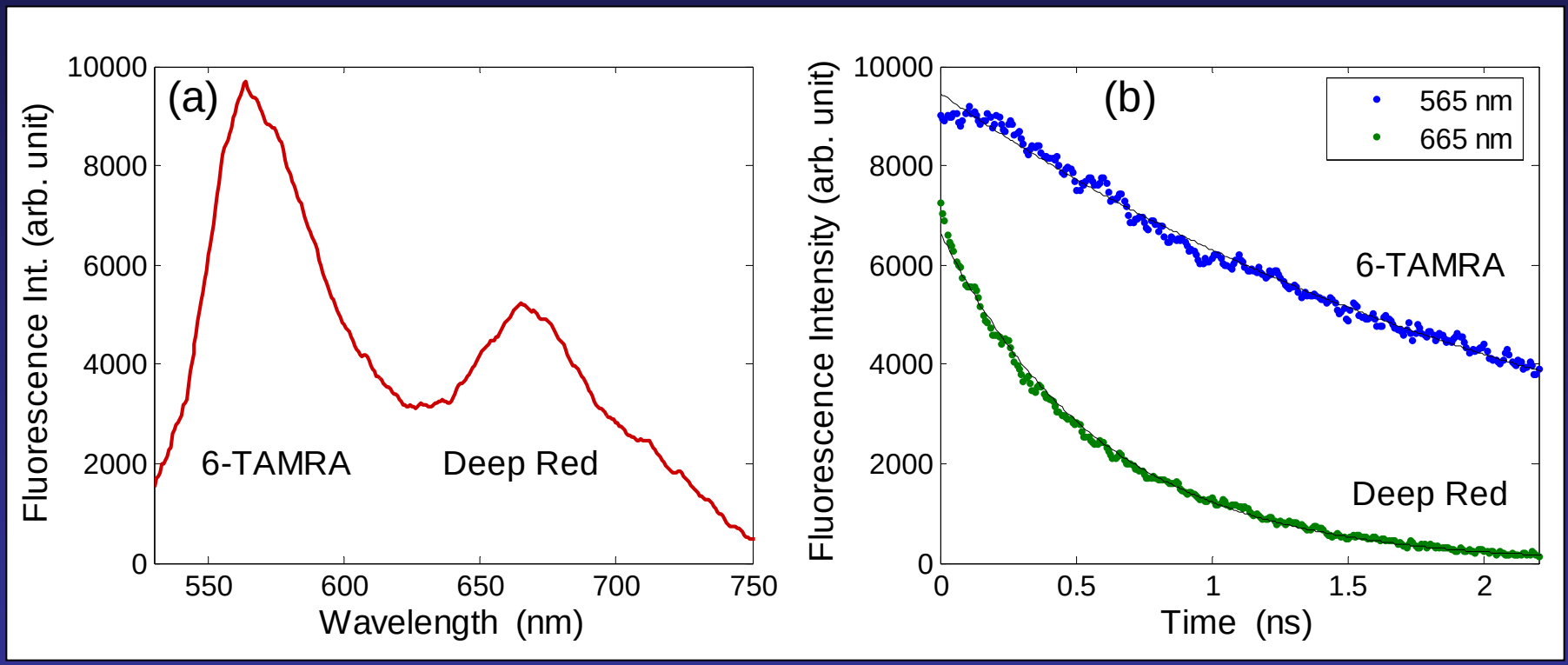
Separate fluorescence from excitation light with Streak camera



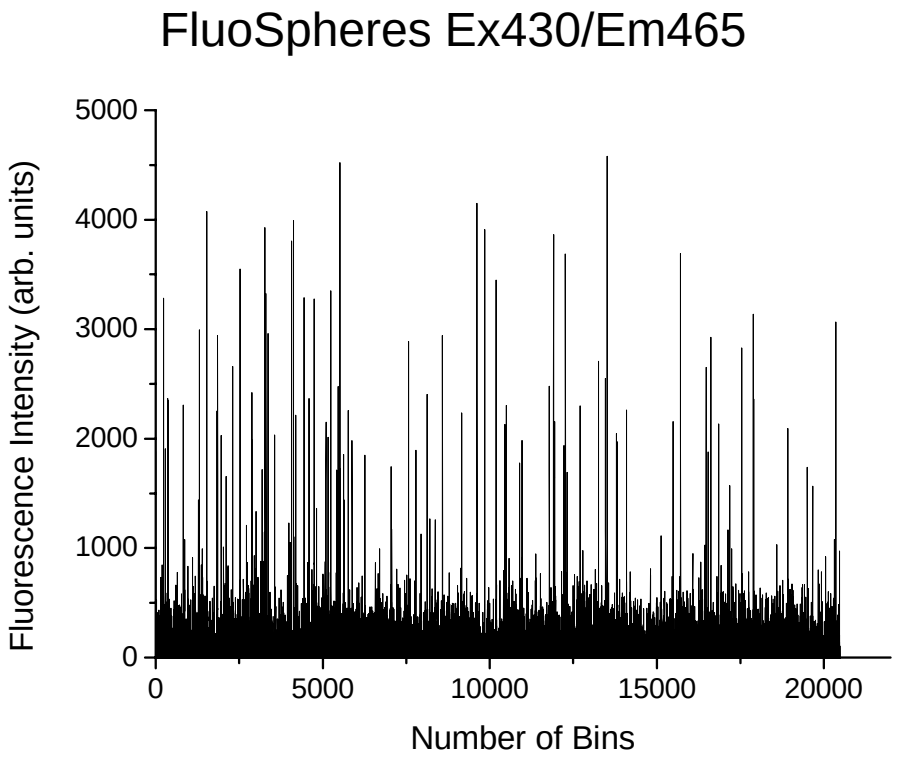
From Hamamatsu

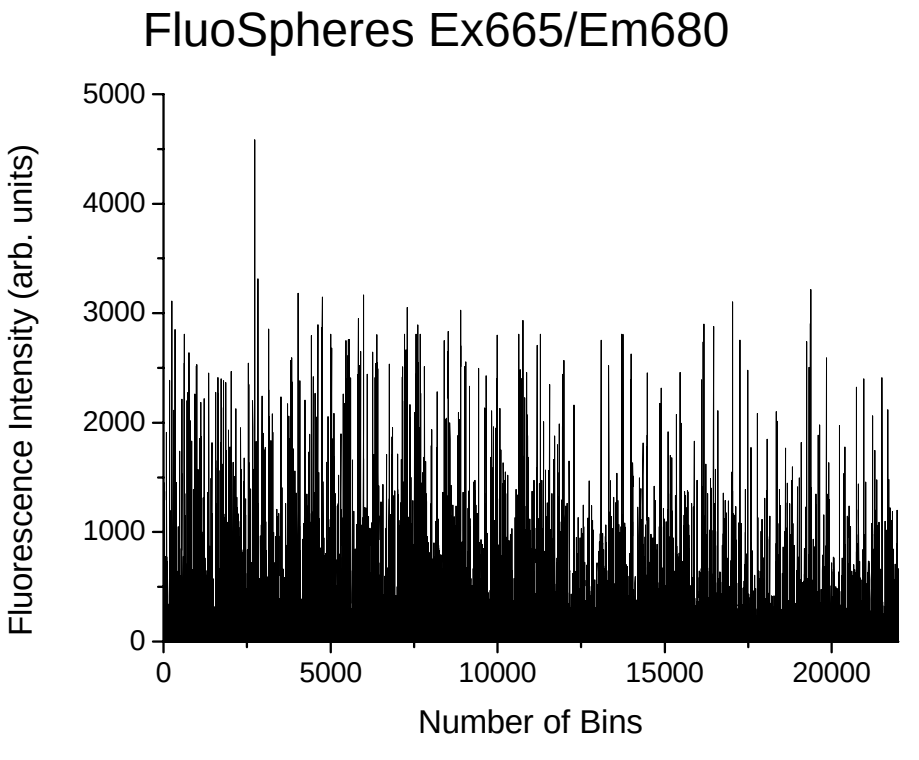


Fluorescence of a two dye (6TAMRA and DeepRed) mixture measured with an ultrafast broadband supercontinuum excitation and a streak camera. The timing delay was adjusted so that the supercontinuum (represented as SC) would appear outside the detection window, by the amount shown.


(a)
Fluorescence Int. (arb. unit)
10000
8000
6000
4000
2000
0
550
600
650
700
750
Wavelength (nm)
6-TAMRA
Deep Red
(b)
Fluorescence Intensity (arb. unit)
10000
8000
6000
4000
2000
0
0
0.5
1
1.5
2
Time (ns)
565 nm
665 nm
6-TAMRA
Deep Red

Potential application for multicolor flow cytometry





Potential Applications

As this work addresses a fundamental detection mechanism, successful development of this novel technology will lead to significant improvements in many different kinds of fluorescence based instruments:

- Flow cytometry
- Fluorescence Microscopy
- Endoscopy
- Fluorescence screening assay
- etc.

Patent: Issued on Oct. 2. 2007, Patent No. 7,277,169
Ye et al., Optics Express 15, 10439-10445 (2007).
News stories: Photonics Spectra, 108-9, Oct. 2007
Laser Focus World, Vol. 43, No. 11, 44-46, 2007.