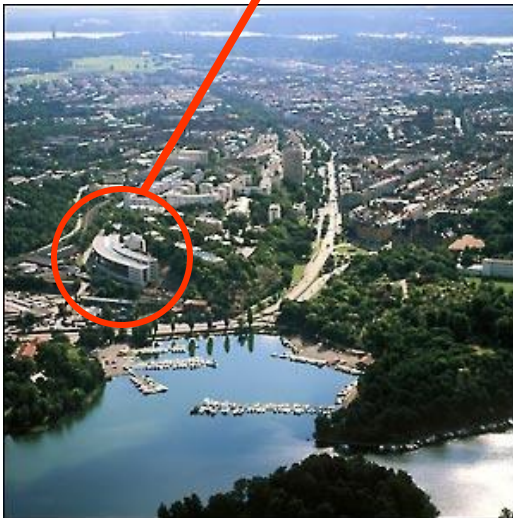


Stockholm University

KTH main campus

Karolinska Institutet

Albanova University Center



Experimental Biomolecular Physics, KTH

11 researchers

1 professor

3 senior researchers

3 postdocs

4 PhD students

Present members:



Niusha Bagheri
(PhD stud)



Baris Demirbay
(PhD stud)



Zhixue Du
(postdoc)



Uliana Kostiv
(postdoc)



Lucía Labrador Paéz
(postdoc)



Haichun Liu
(senior researcher)



Joachim Piguet
(senior researcher)



Elin Sandberg
(PhD stud)



Per Thyberg
(senior researcher)



Chinmaya Venugopal
Srambickal
(PhD stud)



Jerker Widengren
(professor)

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Anna-Karin Ljung



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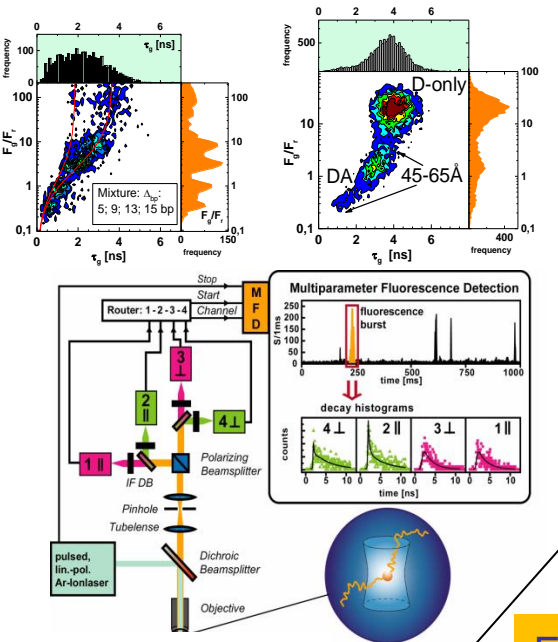


Jerker Widengren
(professor)

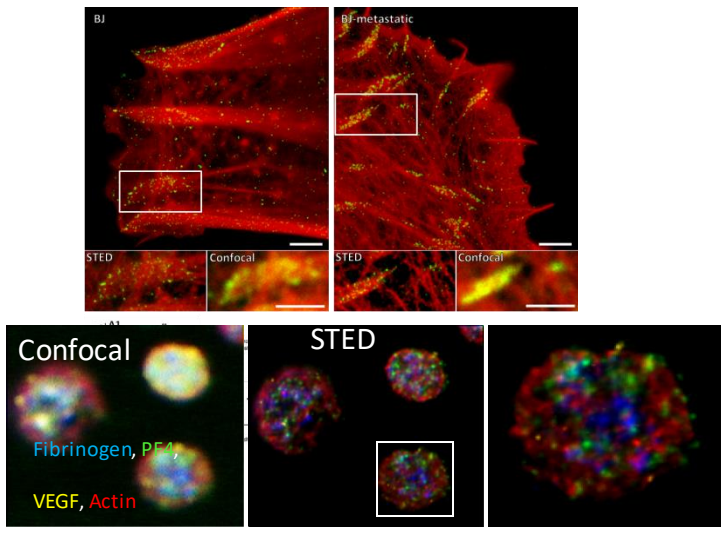
Experimental Biomolecular Physics, KTH

Ultrasensitive / ultrahigh resolution fluorescence spectroscopy / imaging:
Method development & applications (biomolecular research, diagnostics)

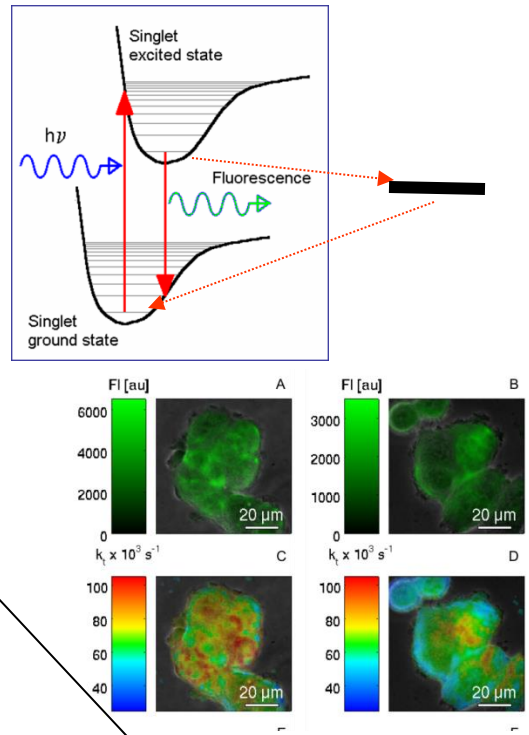
Single molecule spectroscopy



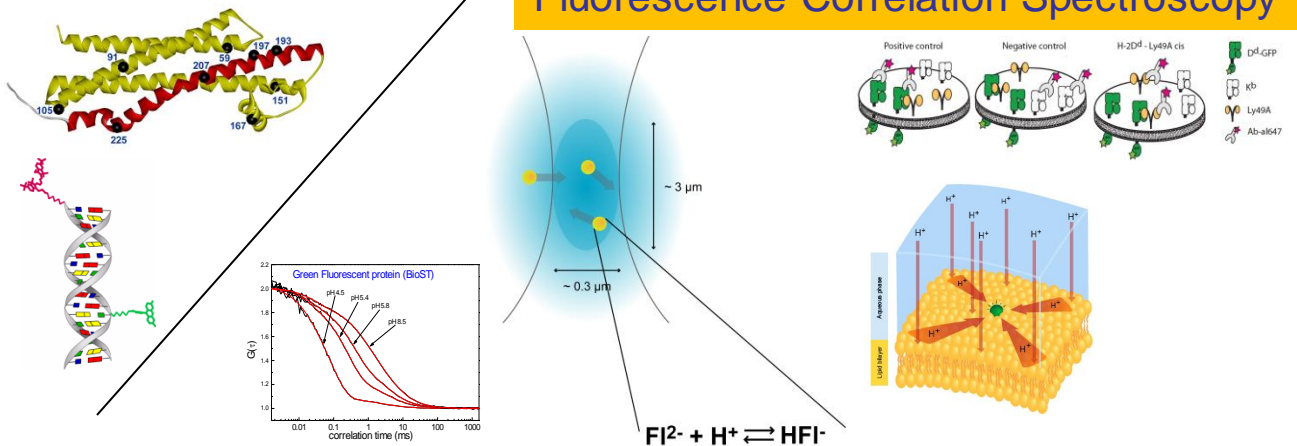
STED microscopy



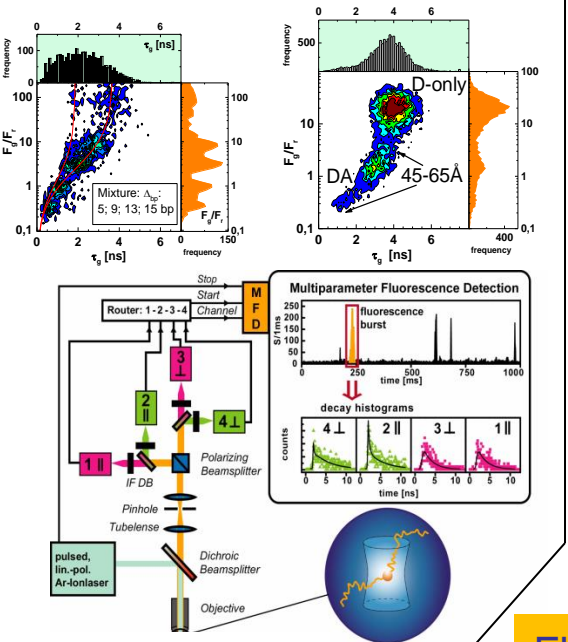
TRAST microscopy



Fluorescence Correlation Spectroscopy

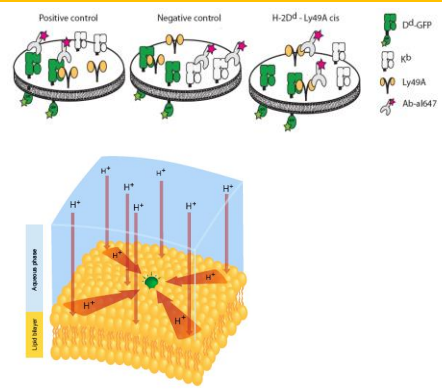
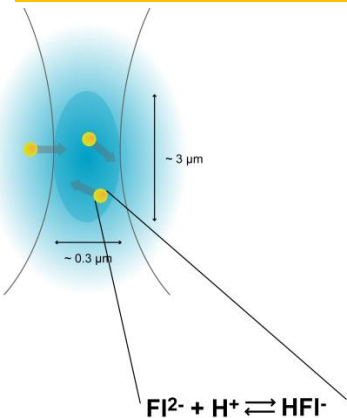
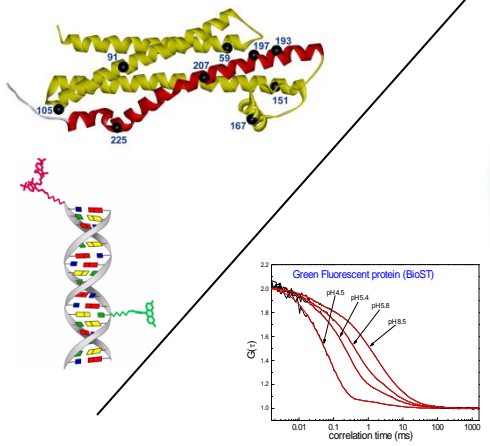


Single molecule spectroscopy

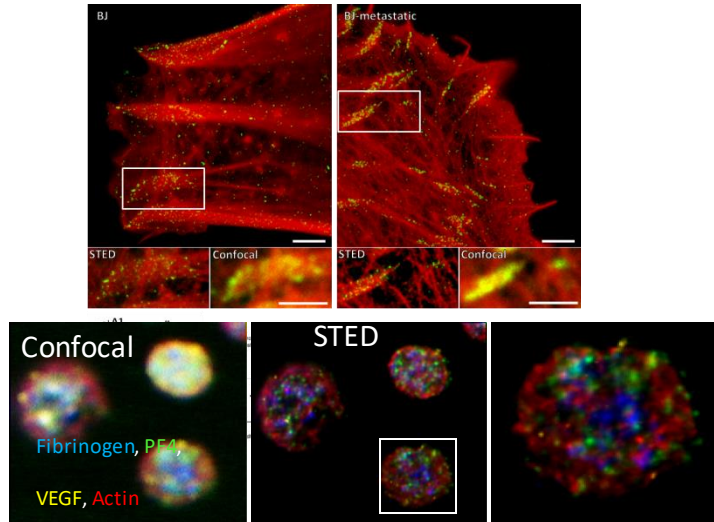


- Limitations:
- Blinking
 - Photophysics of dyes

Fluorescence Correlation Spectroscopy



STED microscopy



2005-2007



FLUODIAMON

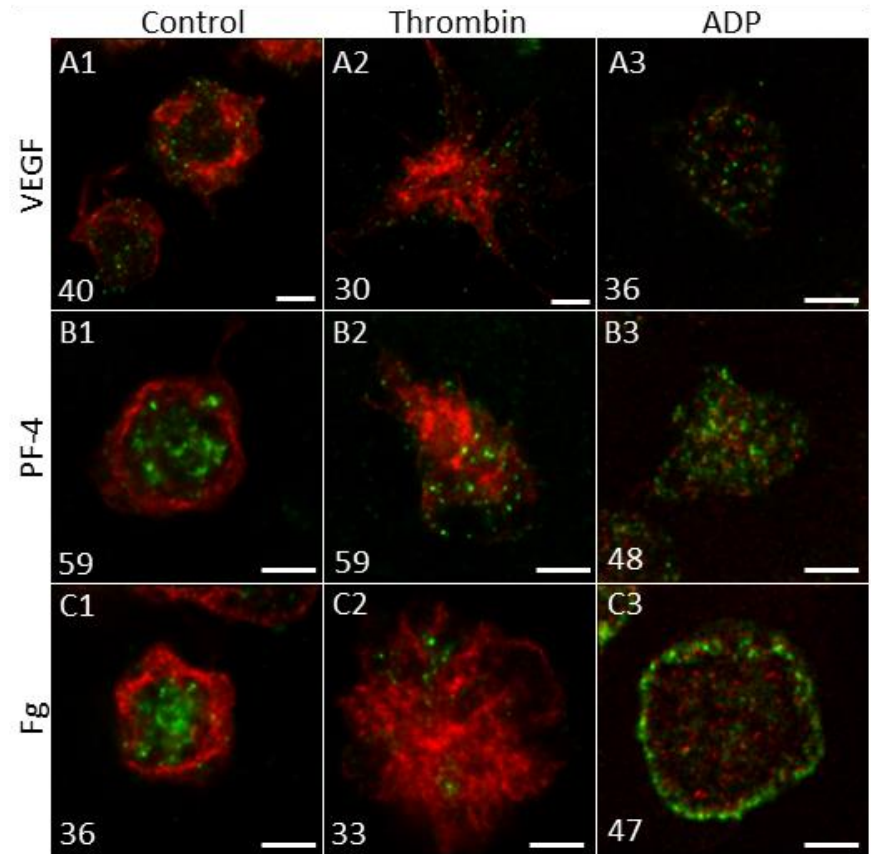
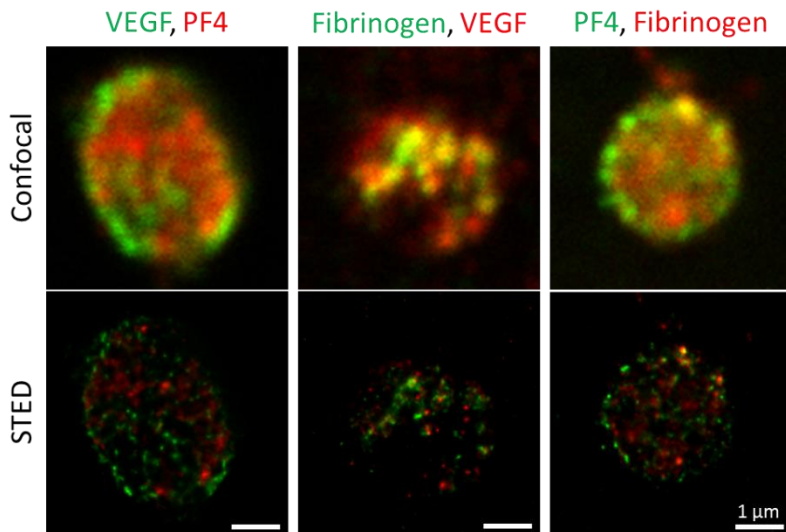


Spin-off
research

2011-

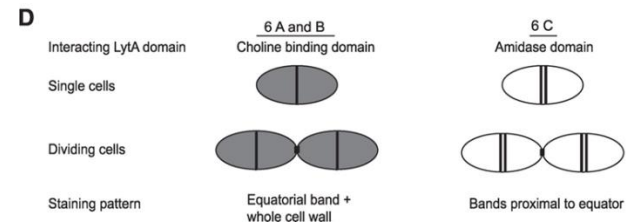
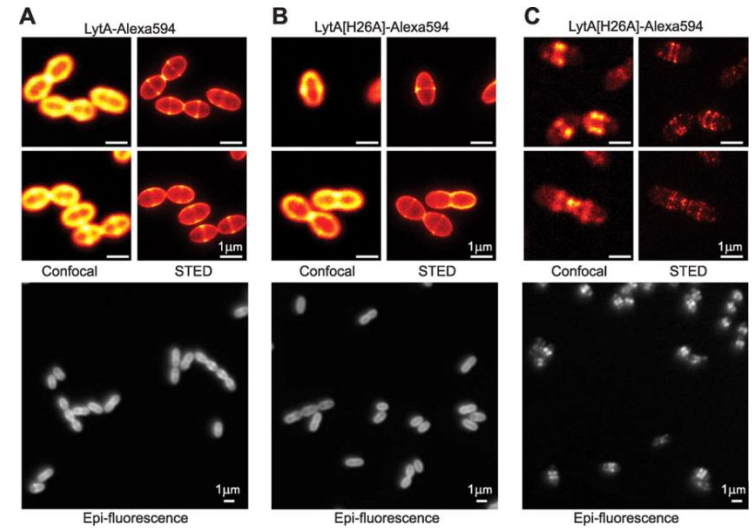
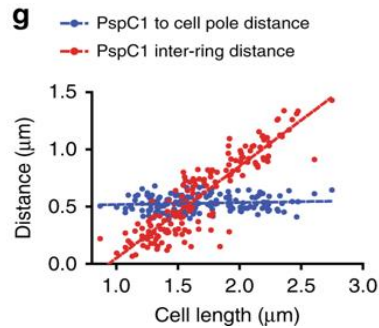
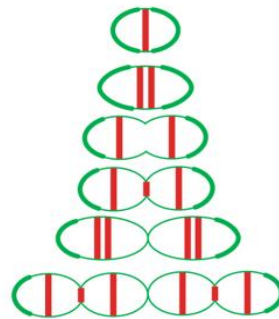
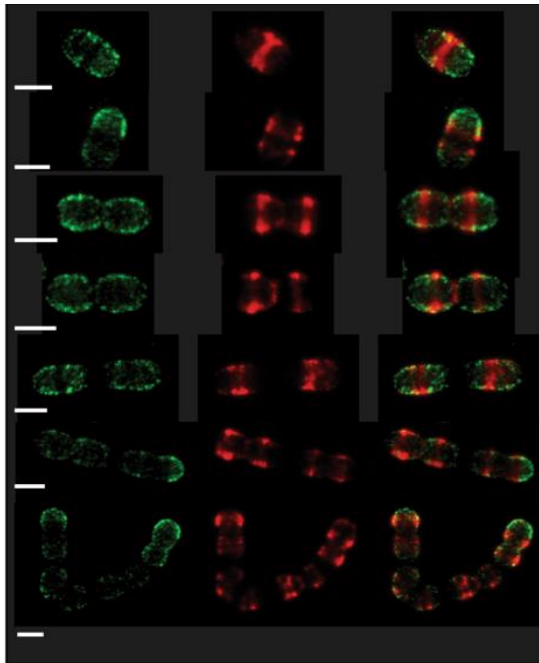
Platelet studies:

(collab. Gert Auer, Karolinska inst)



Pneumococci

Collab. Birgitta Henriques-Normark, KI



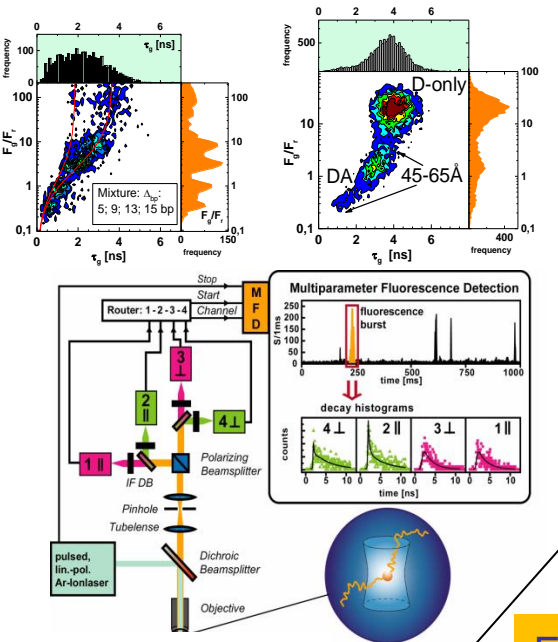
P Mellroth *et al*, *J Biol Chem*, 2012

Pathak *et al*, *Nat Comm*, 2017

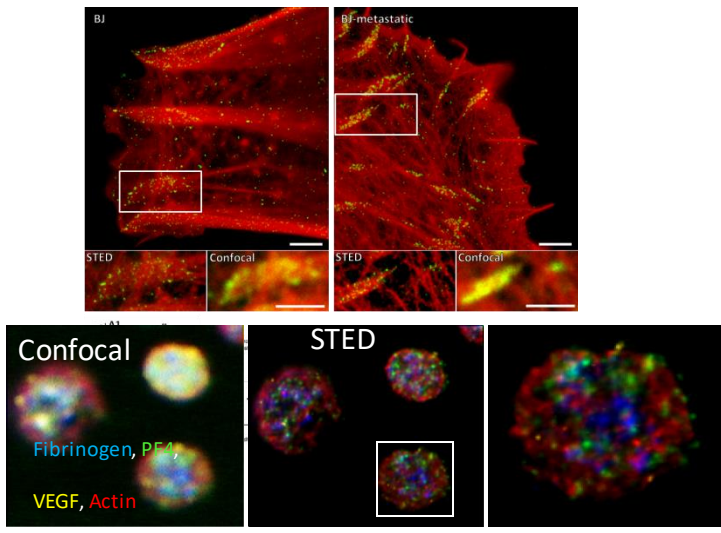
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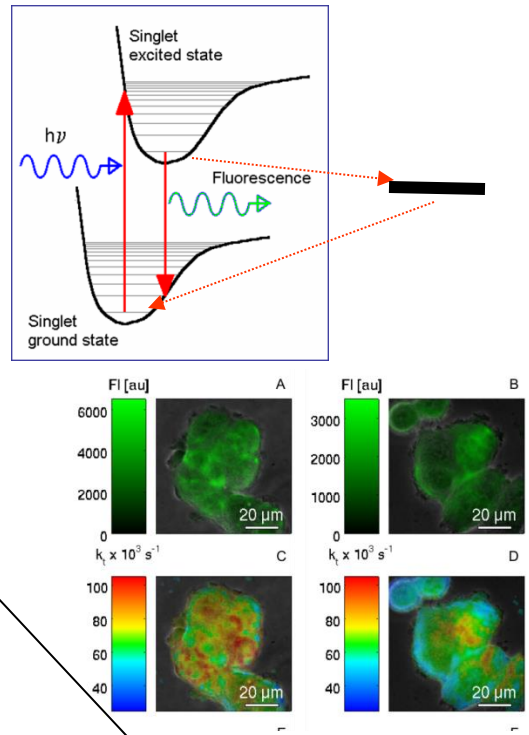
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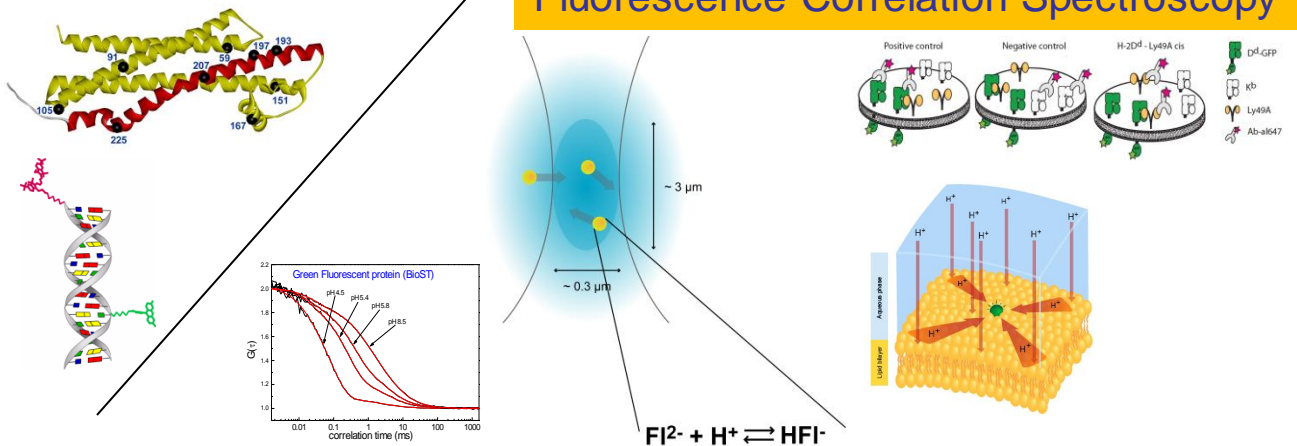
STED microscopy



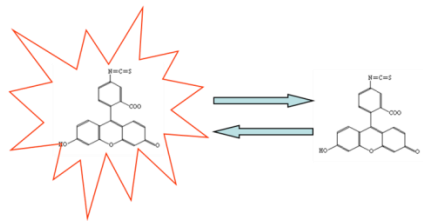
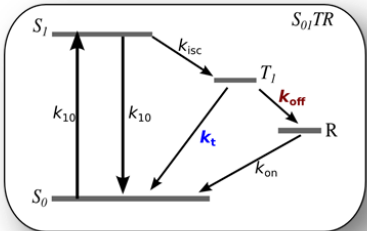
TRAST microscopy



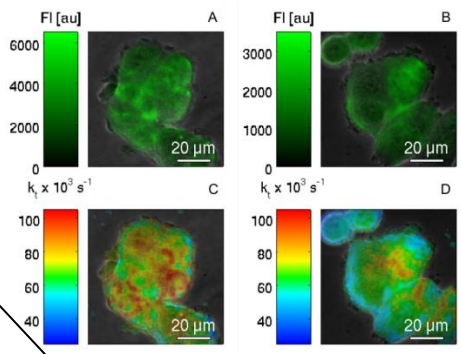
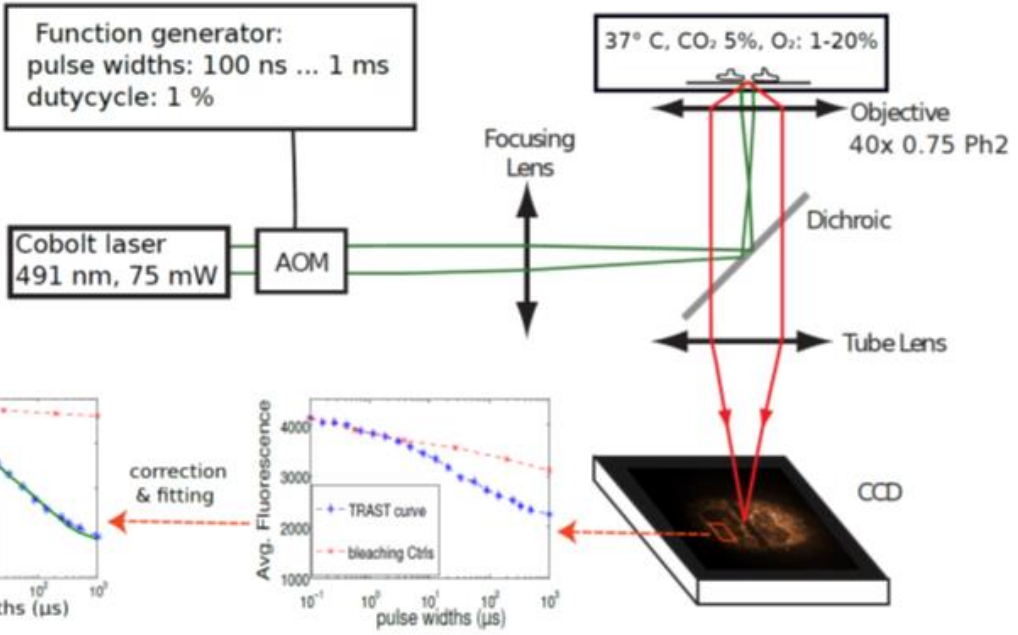
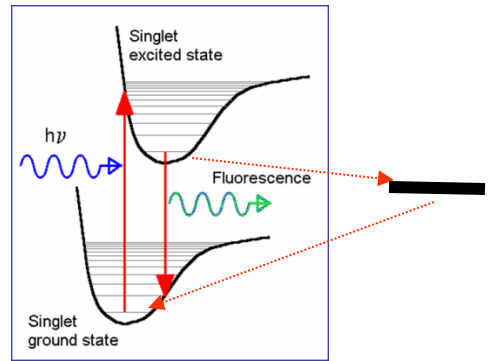
Fluorescence Correlation Spectroscopy



Blinking/switching: source of information

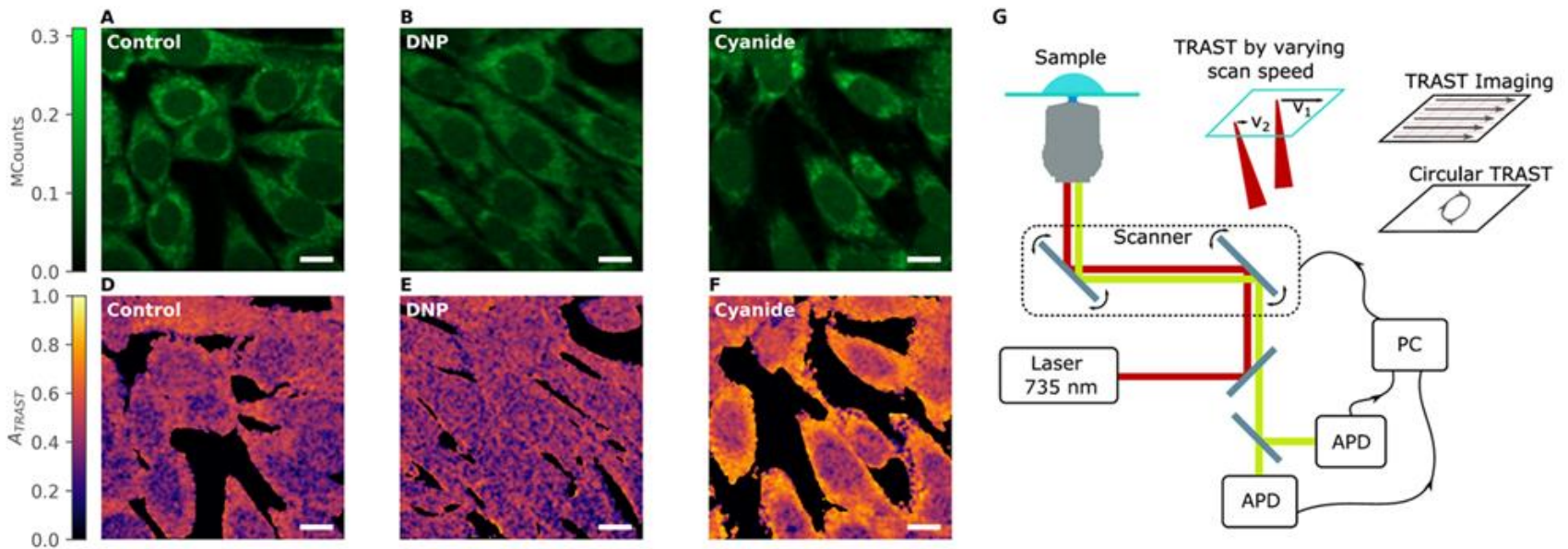


TRAST microscopy



NanoVIB:

- Additional imaging parameter(s)
- FCS/TRAST for fluorophore characterization



X Deliverables, ☆ Milestones

	Year 1				Year 2				Year 3				Year 4			
	03	06	09	12	15	18	21	24	27	30	33	36	39	42	45	48
WP1 (AI) Platform development																
T1.1: Construction of two modular MINFLUX platforms	x															
T1.2: Plan modified Gen I SPAD array detection electronics and interface with them					x											
T1.3: Develop acquisition electronics interfacing with Gen II SPAD array electronics					x								☆			
T1.4: Design/test integrated VIS-NIR-MINFLUX microscope with array detection													x			
WP2 (LLG) Optical integration																
T2.1: Expand MINFLUX platform from WP1 to the NIR, point detection					x ☆											
T2.2: Integrate SRS components, implement SRS-MINFLUX acquisition schemes					x											
T2.3: Integrate Gen I SPAD array, prototype acquisition algorithms									x							
T2.4: Implement two photon activation and TPE TRAST-MINFLUX imaging													x			
T2.5: Optimize and stabilize optical setup and provide critical feedback													x			
WP3 (PII) Detector development																
T3.1: Adapt hardware platform to MINFLUX platform (Gen I electronics)	x															
T3.2: Develop new hardware platform & communication protocol (Gen II electron.)					x											
T3.3: Develop enhanced red and NIR sensitivity CMOS SPAD									☆ x							
T3.4: Develop 10x10 CMOS SPAD array with integrated time-gating									x							
WP4 (APE) Laser for MINFLUX and SRS operation																
T4.1: Develop ultra-fast targeting of arbitrary wavelengths for ps SRS-lasers	x				x				☆							
T4.2: Development of pulse-length switching between ps and fs regimes									x				x			
WP5 (KTH) Labels, acquisition and protocols																
T5.1: Identify fluorophore suitable for NIR-MINFLUX	☆ x															
T5.2: Define acquisition schemes for all imaging modes for fixed and live cells									x							
T5.3: Establish VIS-NIR MINFLUX protein labeling/sample preparation protocols									x							
T5.4: Verify SRS and TPE TRAST imaging on bacteria and host cells									x							
T5.5: Establish combined use of MINFLUX with SRS and/or TPE TRAST imaging									☆ x							
WP6 (KI) Lead application and dissemination																
T6.1: Study pneumococcal surface proteins									x							
T6.2: Study co-localization of pneumococcal surface/pilus with receptor proteins									x							
T6.3: Study nanoscale localization of protein virulence factors													☆			
T6.4: Study distribution patterns of pneumococcal proteins													x			
T6.5: Facility open to potential end-users													x ☆			
WP7 (KTH) Project management and communication																
T7.1: Kick-off meeting, establishment of PMC, AB and I ² EMG.	x		x													
T7.2: Communication activities	x		x		x x											
T7.3: Monitor progress through supervision of deliverables & milestones					x x											
T7.4: Prepare EC interim & final project reports					x x											

MMs of KTH:

WP1: 4

WP2: 14

WP3: 1

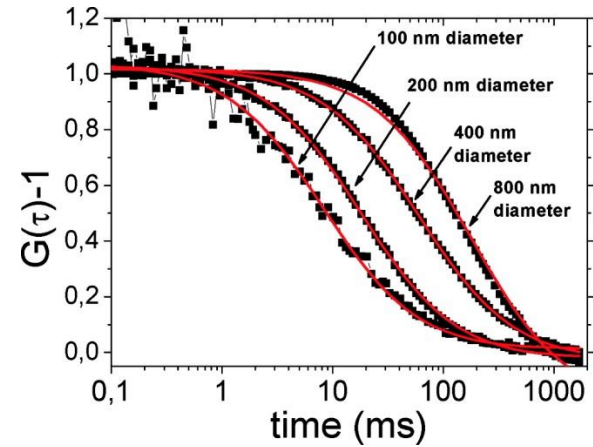
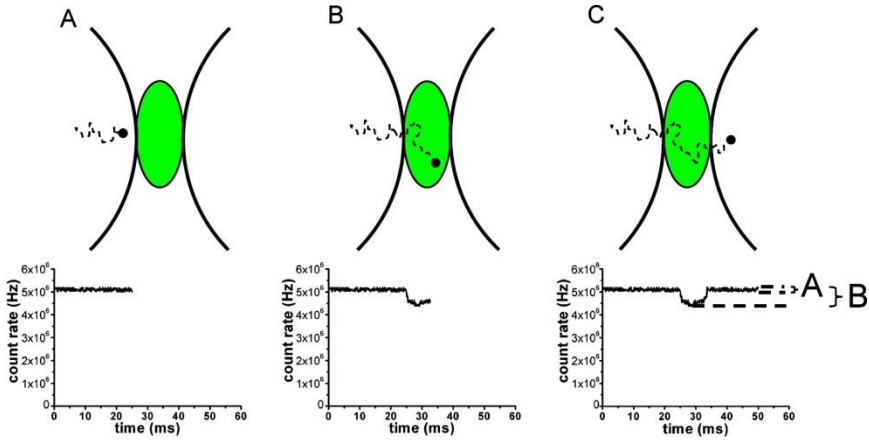
WP4: 1

WP5: 72

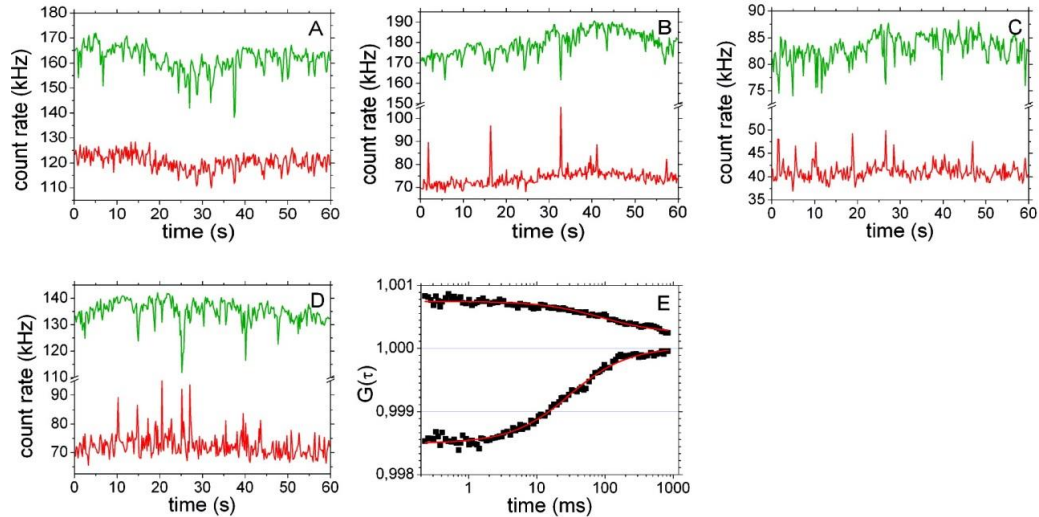
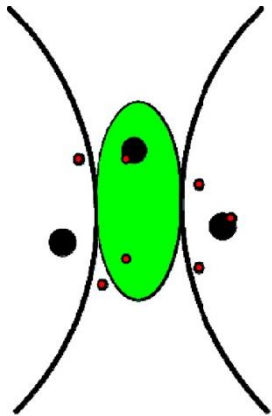
WP6: 16

WP7: 20

inverse-FCS



inverse-FCCS



Wennmalm S *et al*, *Anal. Chem.* 81(22), 9209-9215, 2009

Wennmalm S and Widengren J, *Anal. Chem.* 82(13), 5646-5651, 2010

Wennmalm S and Widengren J, *Frontiers in Bioscience* (2011)

Inverse CARS-based Correlation Spectroscopy (iCARS-CS)

