



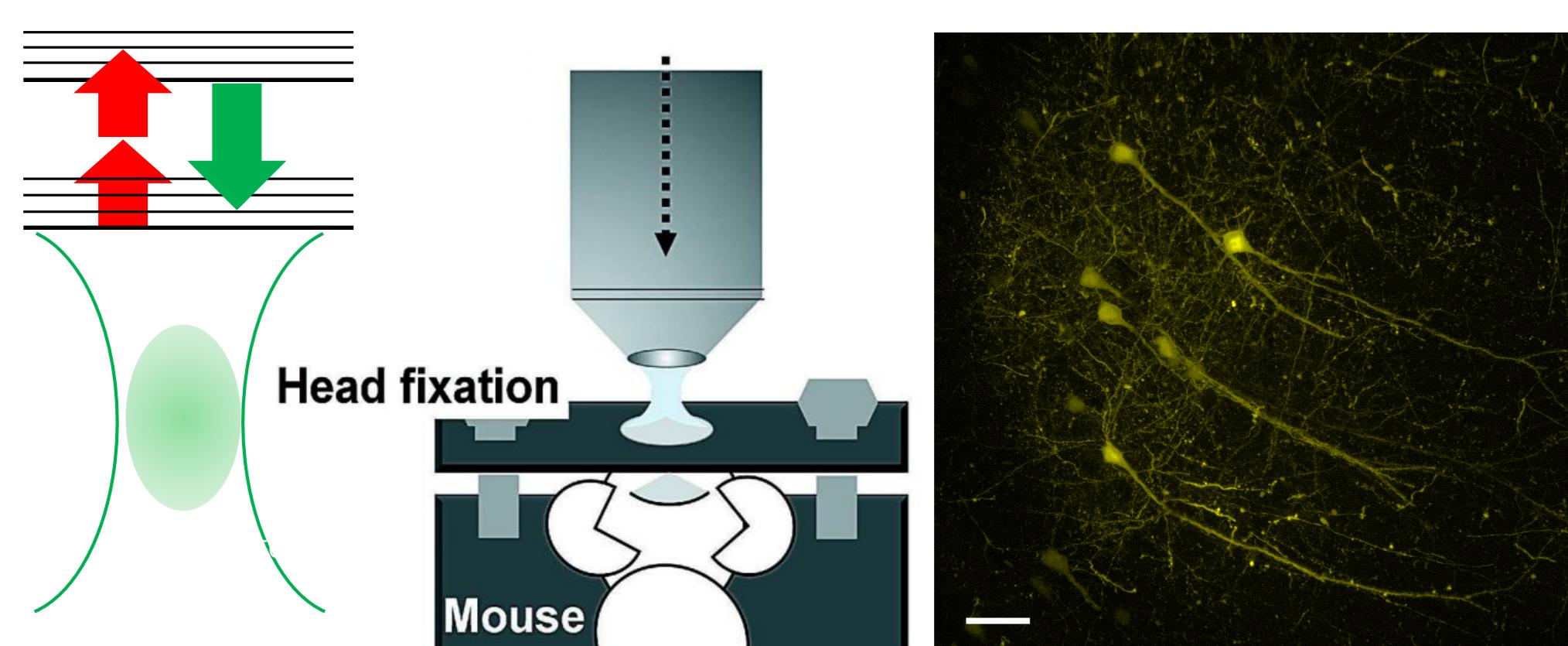
# Heinze Lab: Our imaging systems and experts

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SCAN ME

## Two-Photon Microscopy (2PM)



- + Optical sectioning
- + 3D imaging
- + Deep tissue penetration
- + Intravital imaging
- + Low autofluorescence
- Slow
- Limited choice of dyes
- High risk of photobleaching



Katrin

Stritt S, Beck S, Becker IC, Vögtle T, Hakala M, Heinze KG, Du X, Bender M, Braun A, Lappalainen P, Nieswandt B: **Twinfilin 2a regulates platelet reactivity and turnover in mice.** *Blood*. 2017 Oct 12;130(15):1746-1756, DOI: 10.1182/blood-2017-02-770768.

Dütting S, et al. **A Cdc42/RhoA regulatory circuit downstream of glycoprotein Ib guides transendothelial platelet biogenesis.** *Nat Commun.* 2017 Jun 15;8:15838. DOI: 10.1038/ncomms15838.

Angay O, Friedrich M, Pinnecker J, Hintzsche H, Stopper H, Hempel K, Heinze KG. **Image-based modeling and scoring of Howell-Jolly Bodies in human erythrocytes.** *Cytometry A*. 2018 Mar;93(3):305-313, DOI: 10.1002/cyto.a.23123.

## Data Analysis



Fiji



Huygens



Imaris



Ilastik



SymPhoTime

COMSOL



Schreiber B, HS Heil, M Kamp, KG Heinze (2018): **Live-cell fluorescence imaging with extreme background suppression by plasmonic nanocoatings;** *Optics Express*. 26(16):21301, DOI: 10.1364/OE.26.021301.

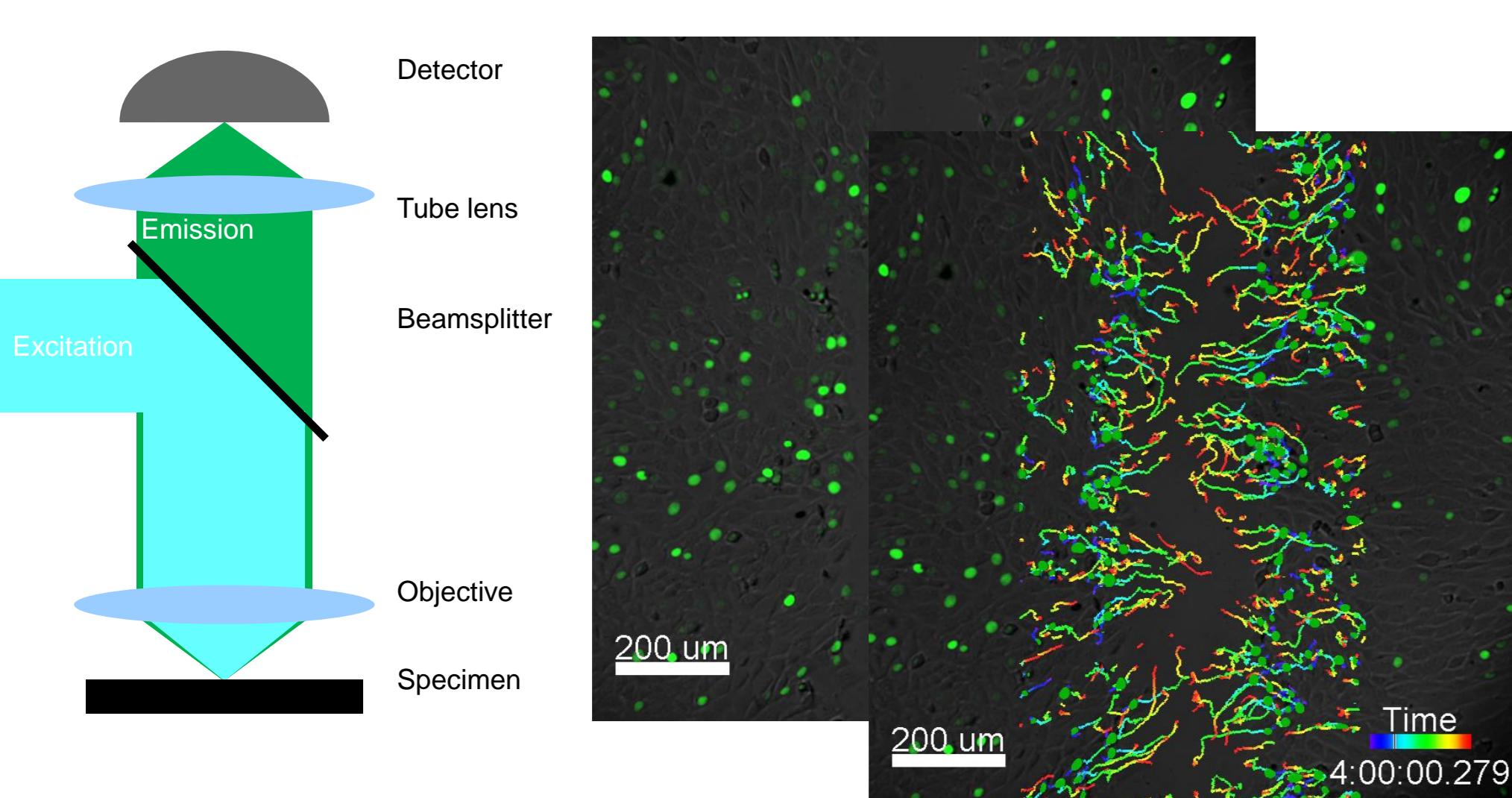
Schreiber B, M Kauk, HS Heil, M Emmerling, I Tessmer, M Kamp, S Höfling, U Holzgrabe, C Hoffmann, KG Heinze (2018): **Enhanced fluorescence resonance energy transfer in G protein-coupled receptor probes by nano-coated microscopy coverslips;** *ACS Photonics*, DOI: 10.1021/acspophotonics.8b00072.

Heil HS, B Schreiber, R Götz, M Emmerling, M-C Dabauvalle, G Krohne, S Höfling, M Kamp, M Sauer, KG Heinze (2018): **Sharpening emitter localization in front of a tuned mirror;** *Light: Science and Applications*, DOI: 10.1038/s41377-018-0104-z.

Stegner D, JMM vanEeuwijk, O Angay, MG Gorelashvili, D Semeniak, J Pinnecker, P Schmithausen, I Meyer, M Friedrich, S Dütting, C Brede, A Beilhack, H Schulze, B Nieswandt, KG Heinze (2017): **Thrombopoiesis is spatially regulated by the bone marrow vasculature.** *Nat Commun* 25;8(1):127. DOI: 10.1038/s41467-017-00201-7.

Gorelashvili MG, O Angay, K Hemmen, V Klaus, D Stegner, KG Heinze (2019): **Megakaryocyte volume modulates bone marrow niche properties and cell migration dynamics,** *Haematologica*, DOI: 10.3324/haematol.2018.202010. [Epub ahead of print]

## Fluorescence Video Microscopy



- + Fast (camera-based acquisition)
- + Multi-color
- + Live cell long-term acquisition
- + Photon efficient
- No optical sectioning  
→ risk to detect scattered and out-of focus light

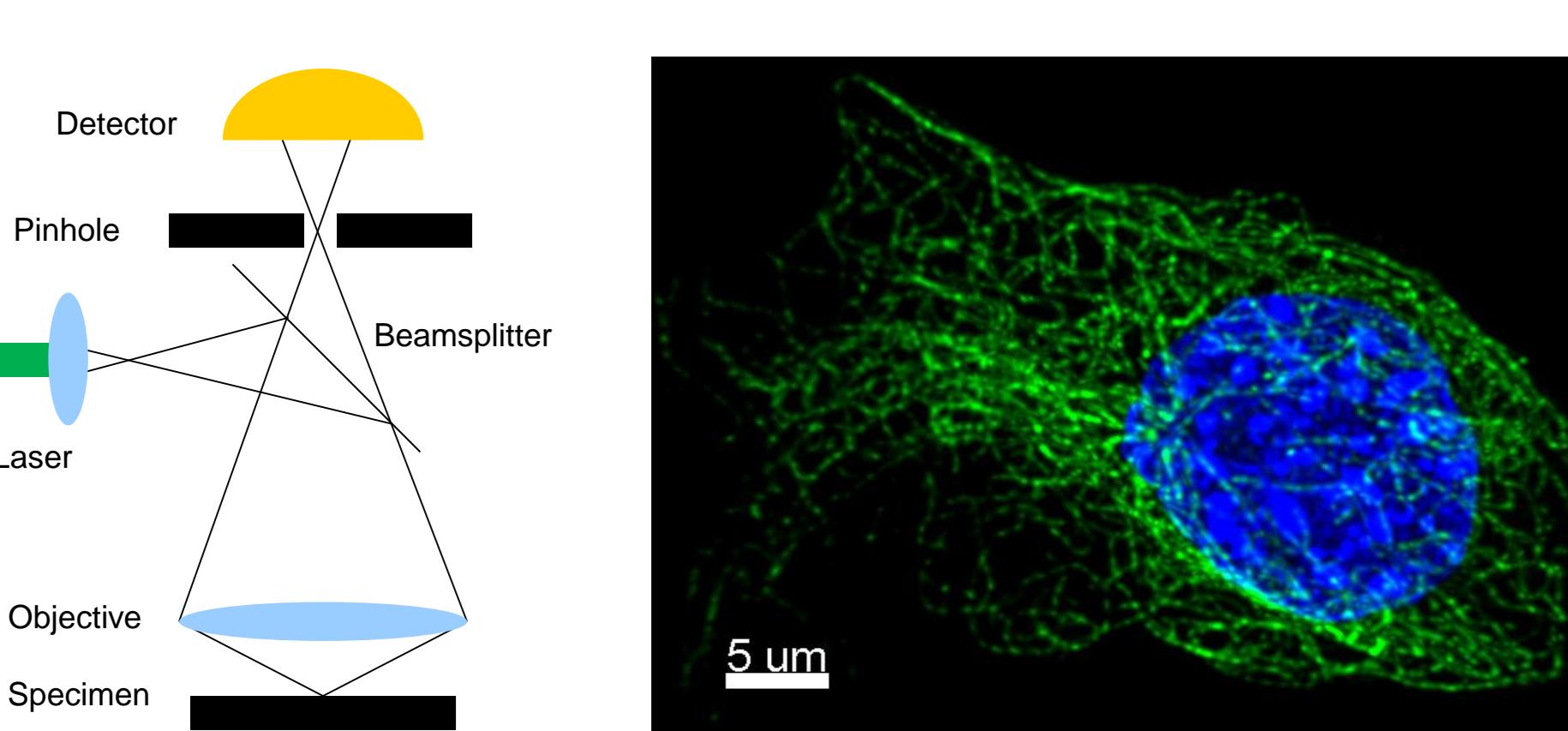


Mike

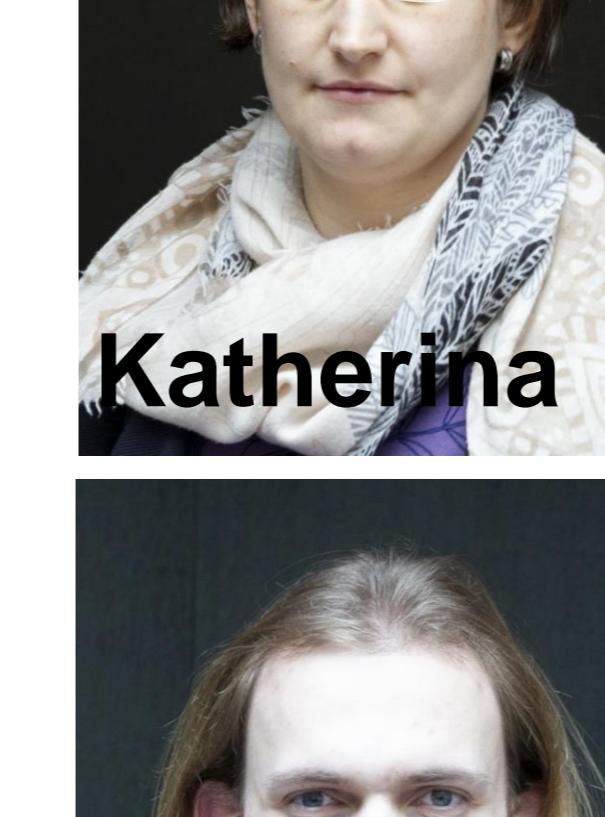


Kerstin

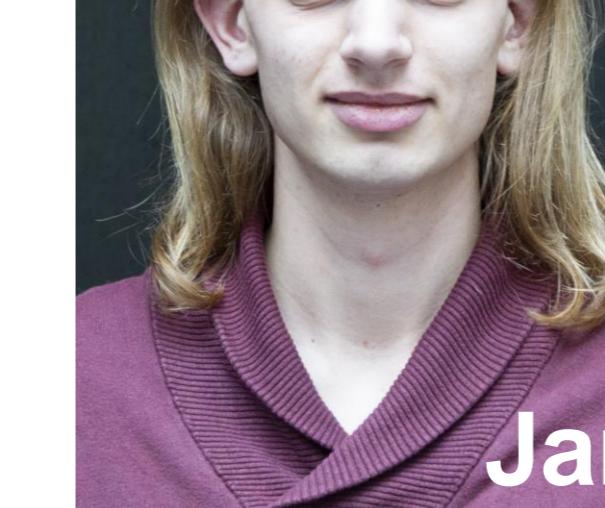
## Confocal Fluorescence Microscopy



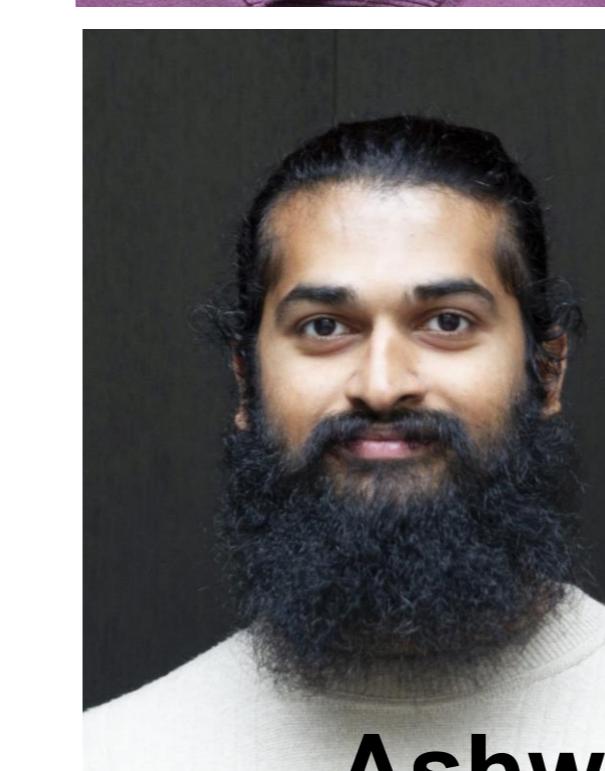
- + Optical sectioning (pinhole)
- + 3D imaging
- + Live cell long-term acquisition
- + Multi-color
- High risk of photobleaching
- Low sample penetration
- Slow



Katherina



Jan



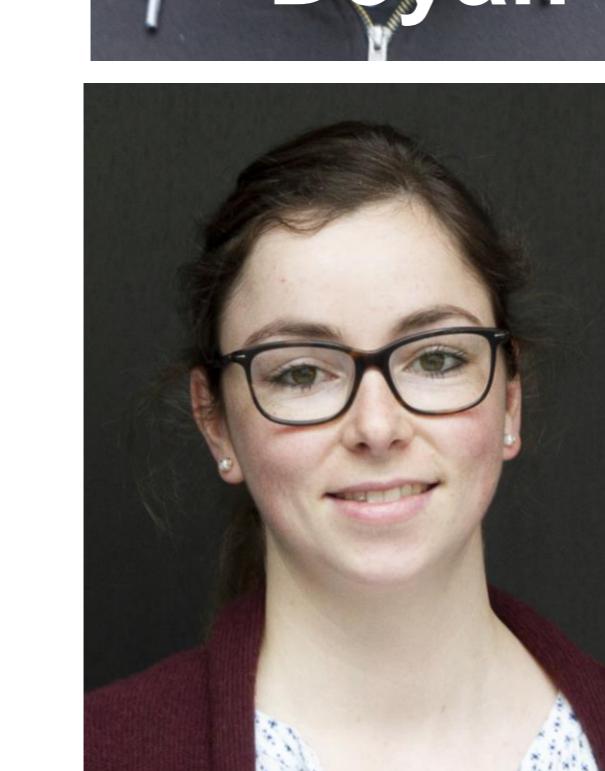
Ashwin



Susobhan



Deyan

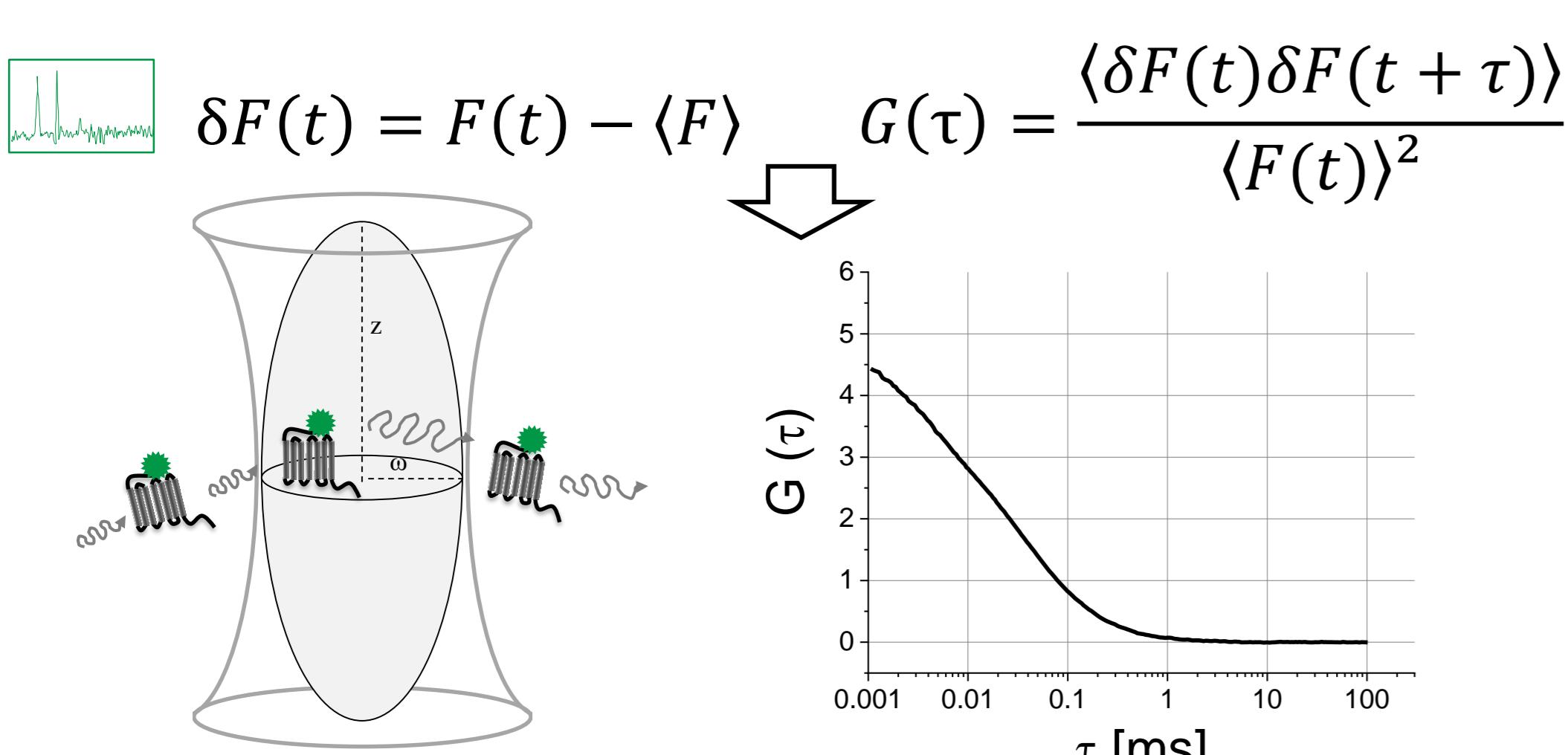


Hannah



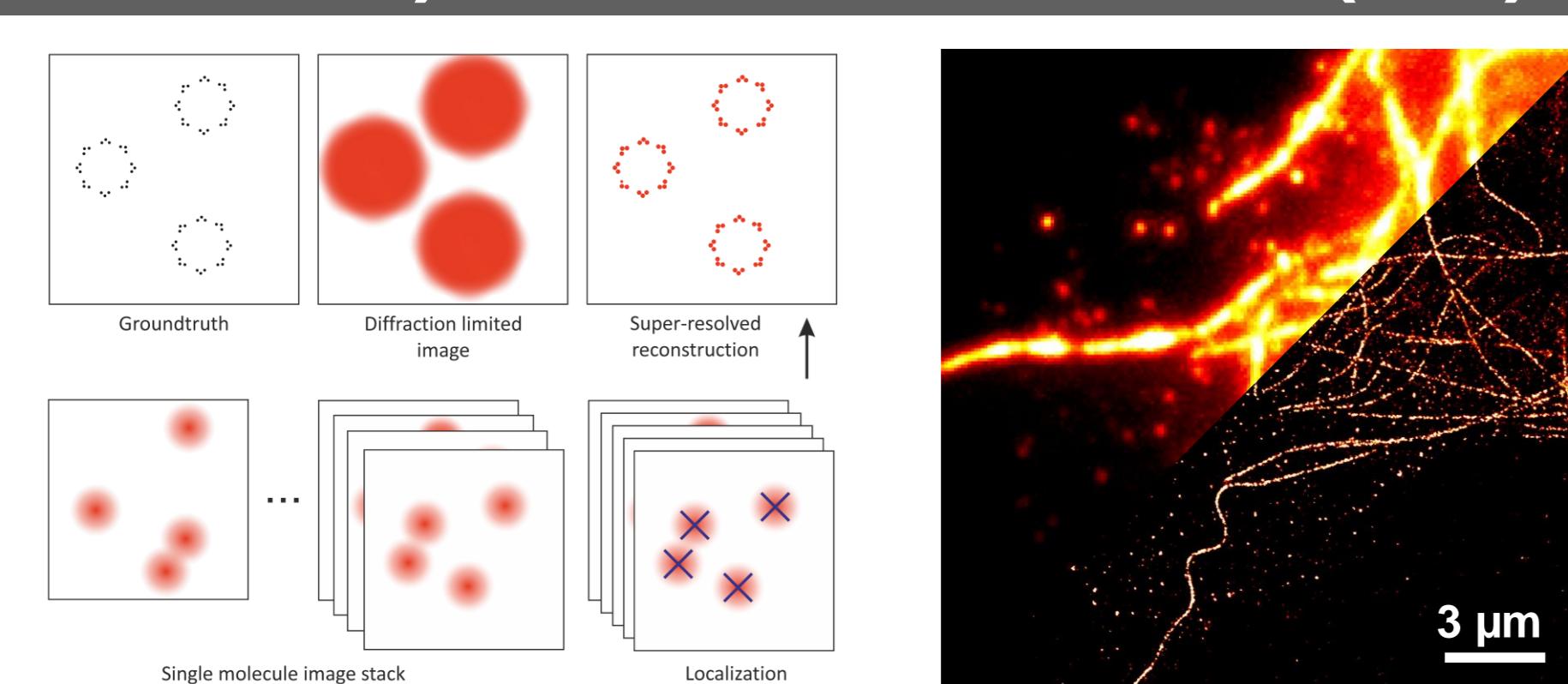
Jürgen

## Fluorescence Correlation Spectroscopy (FCS)



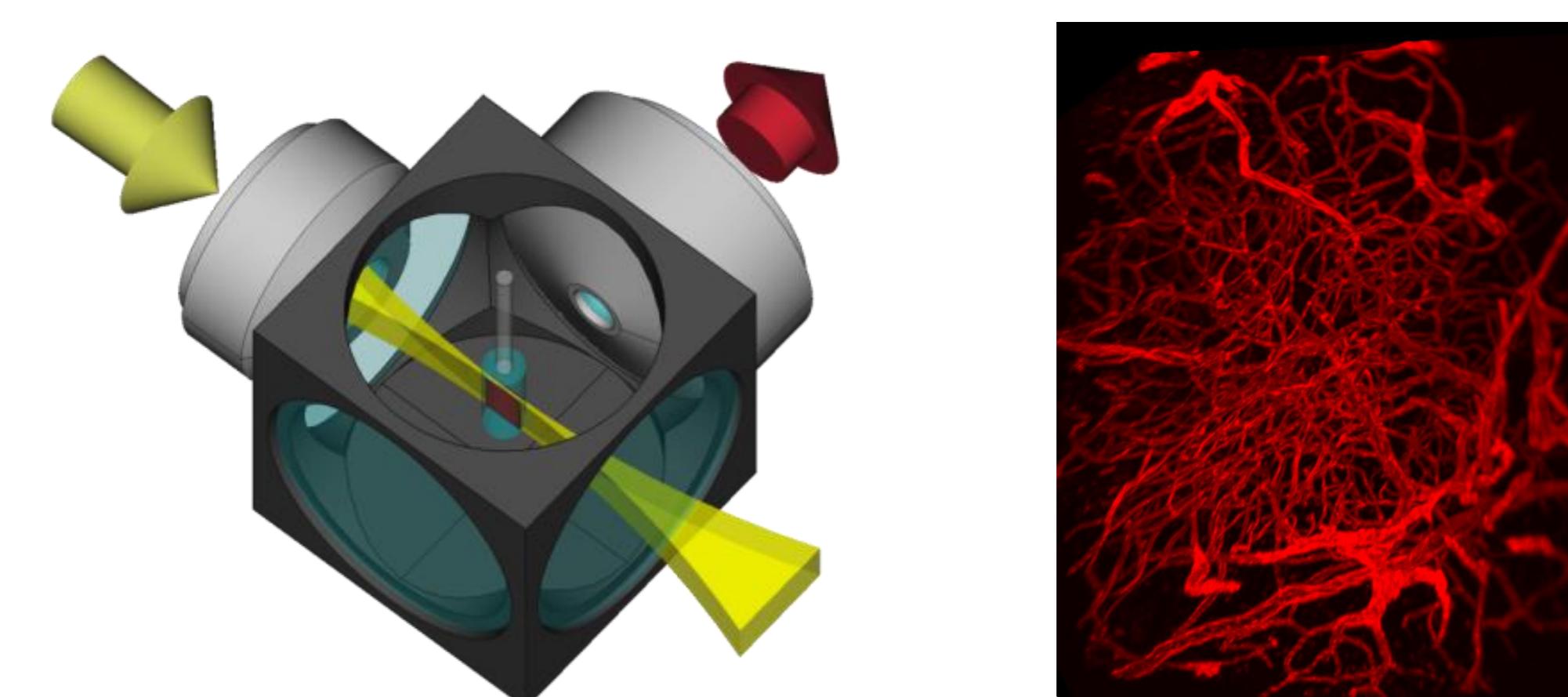
- + Confocal sectioning
- + Time-resolved information
- + Single molecule sensitive
- + Tracing chemical pathways
- + Determining
  - diffusion coefficients
  - hydrodynamic radii
  - average concentrations
  - singlet-triplet dynamics
- No image
- Challenging modelling

## Direct Stochastic Optical Reconstruction Microscopy (dSTORM), mirror enhanced (me)STORM



- + Camera-based acquisition
- + Single molecule detection
- + Super-resolution
- Very limited choice of dyes
- Limited live cell compatibility
- Slow

## Light-Sheet Fluorescence Microscopy (LSFM)



- + 3D imaging of large specimen with cellular resolution
- + Fast camera-based acquisition
- + Multi-color
- Limited choice of dyes
- Optical clearing required
- Long sample preparation  
→ low throughput