

John Lock



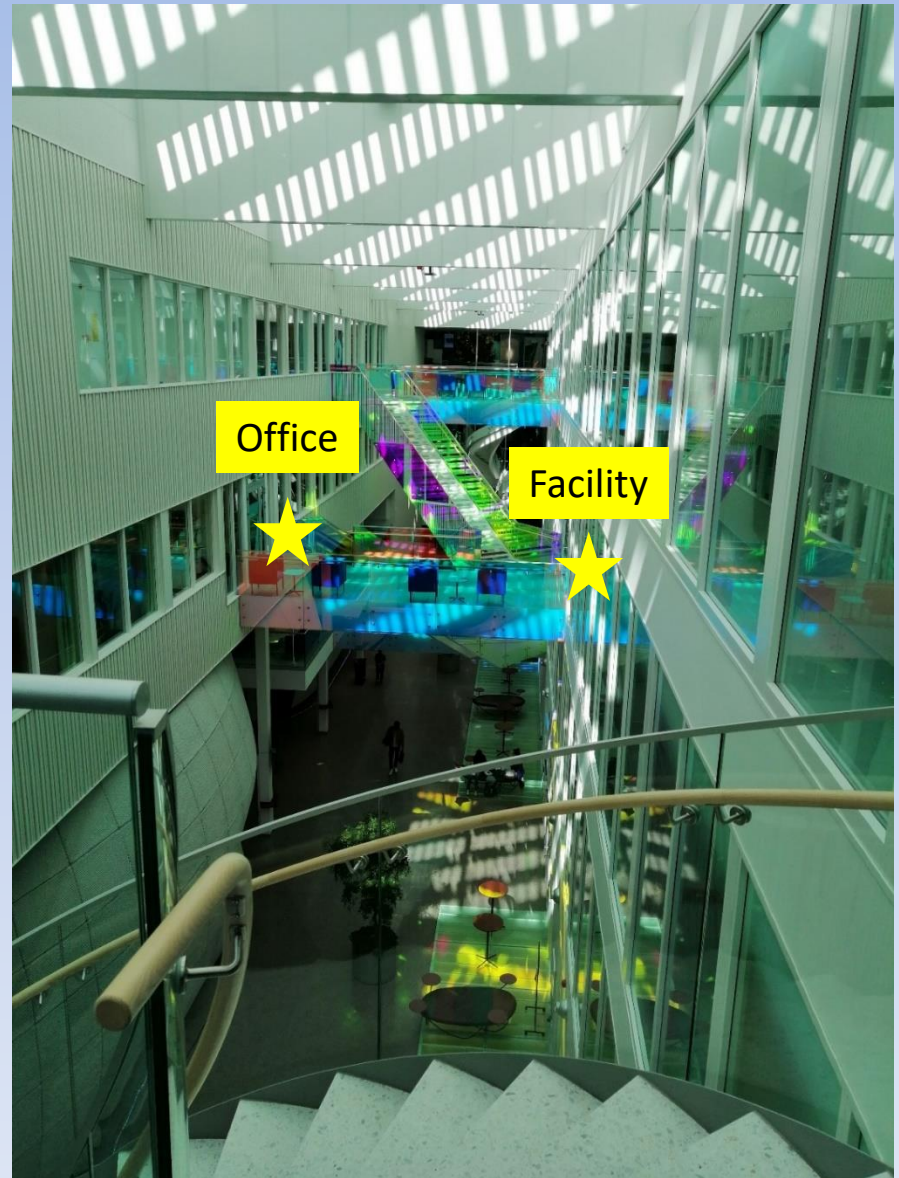
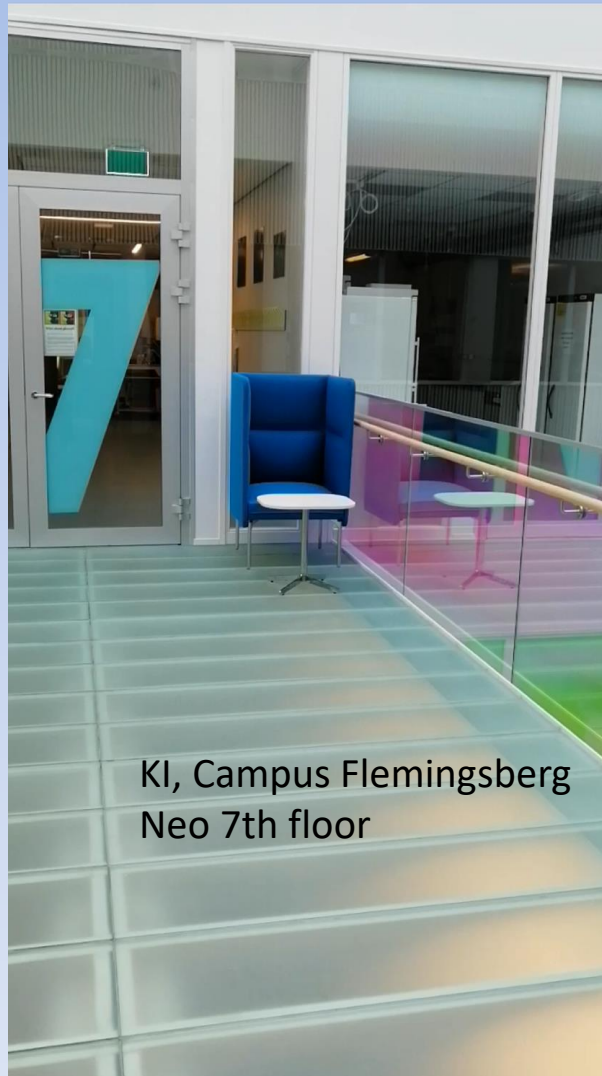
# The LCI core facility:

Advanced microscopy at your doorstep

Karolinska Institutet, Neo  
Sylvie Le Guyader, Director

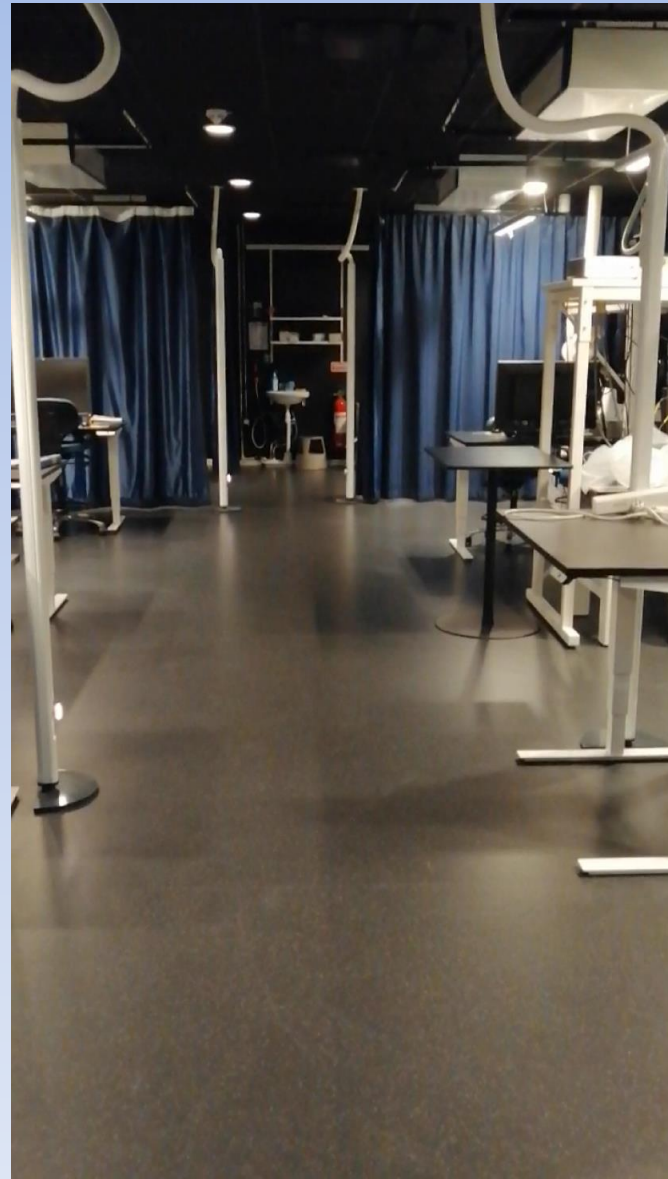
The Live Cell Imaging core facility

# LCI core facility virtual tour! 😊



The Live Cell Imaging core facility

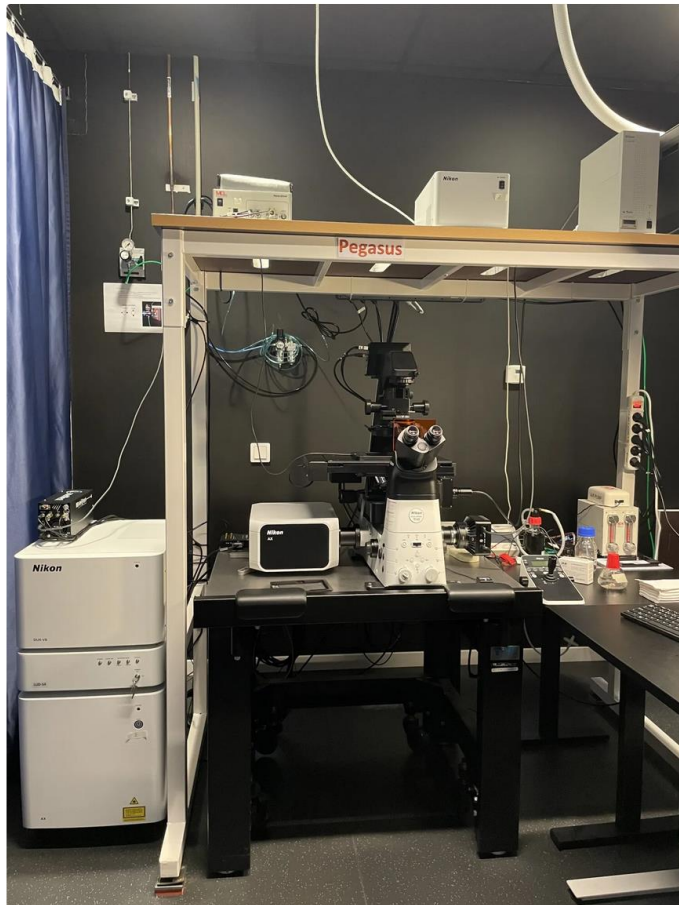
# LCI core facility virtual tour! 😊



The Live Cell Imaging core facility

# LCI core facility virtual tour! 😊

## Pegasus



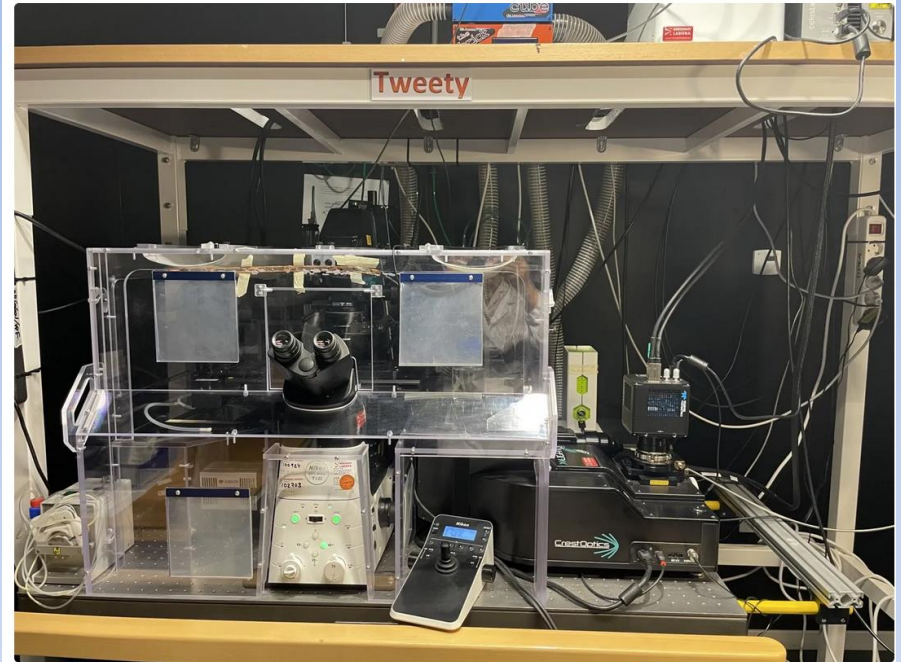
### This system can be used as

- Single point scanning confocal with resonant scanner for fast imaging and spectral detector for channel unmixing
- Wide field with color, monochrome, and polarized light imaging

### Equipment specifications

- Nikon Ti2-E inverted and fully motorized microscope stand
- Stage top incubator
- Resonant scanner

## Tweety



### This system can be used as

- Multipoint spinning disk confocal
- Widefield
- Micropatterning (printing proteins on a dish) and micromanufacturing (making microwells)

### Equipment specifications

- Nikon Ti2 inverted and fully motorized microscope stand with up to 32 mm FOV
- Crest Optics X-Light V3 spinning disk (50 um pinholes with 250 um interval)
- Lumencor Celesta light source with Despeckler
- Full size incubator for life cell imaging
- Fast image acquisition 100 um

# LCI core facility virtual tour! 😊

## Orion



Photo: LCI facility

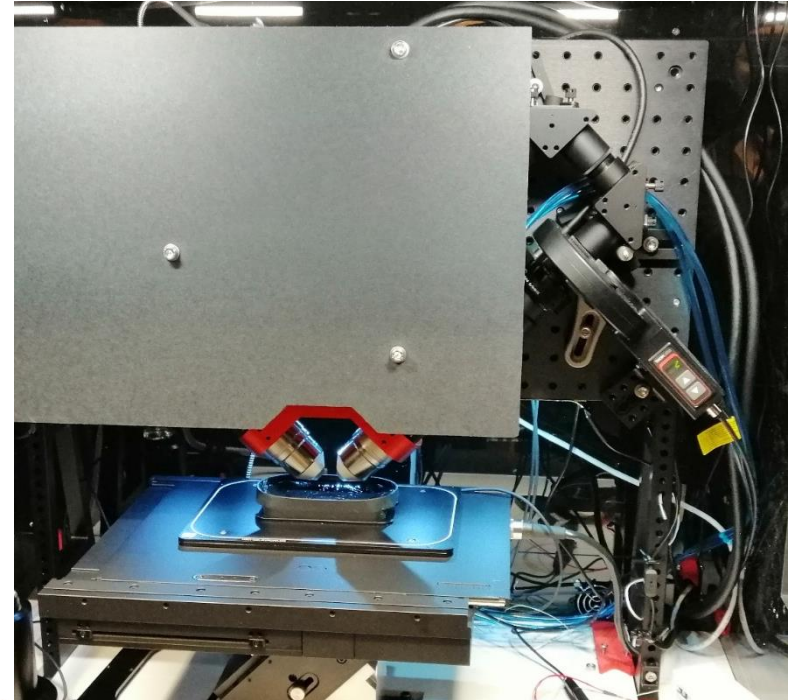
### This system can be used as

- Multipoint spinning disk confocal
- Widefield
- Super resolution – DeepSIM

### Equipment specifications

- Nikon Ti2 inverted and fully motorized microscope stand
- Crest Optics X-Light V3 spinning disk (50 um pinholes with 250 um interval)
- BrixX HUR Ultra laser unit (Omikron-L aserage)

## Aurora



### This system can be used as

- Light sheet microscope

### Equipment specifications

- Upright
- Full size incubator for life cell imaging
- Fully motorized including xy scanning size of a multiwell plate
- z fast beam scanning 900 um, additional stage scanning 1 cm

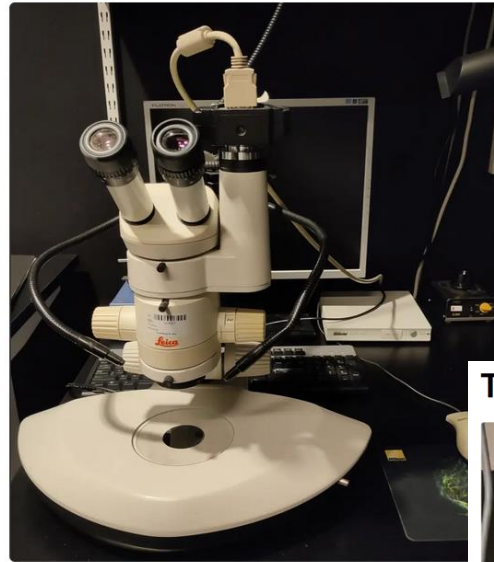
# LCI core facility virtual tour! 😊

## Minerva



- This system can be used as
- Widefield
- Slide scanner
- Laser microdissection of tissue samples

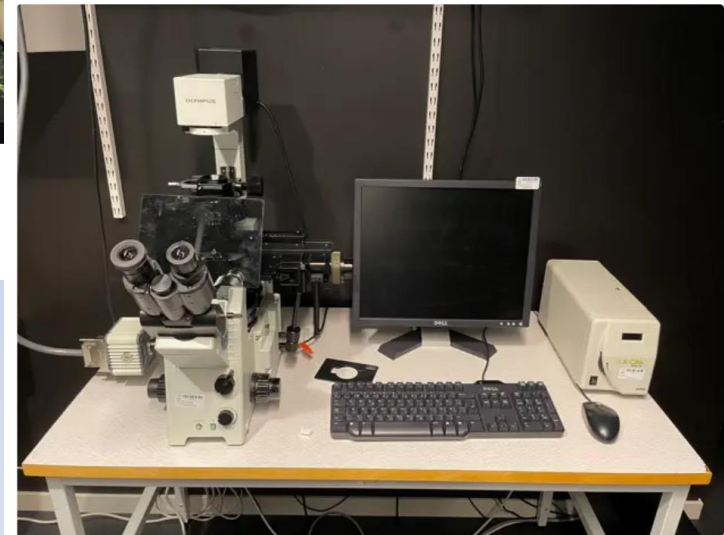
## Iris



This system can be used as:

- Stereomicroscope

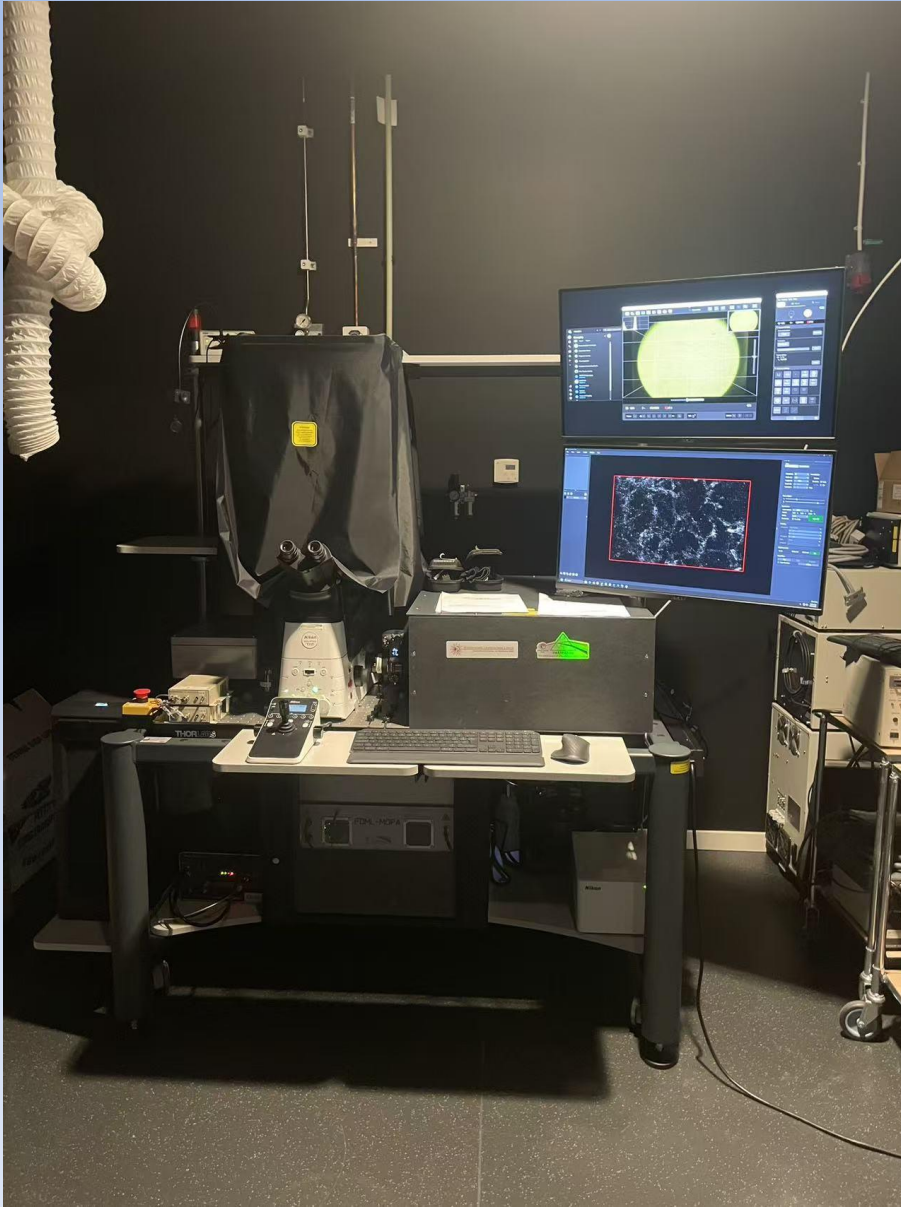
## Theia



This system can be used as:

- Widefield

# LCI news: SWEEPICS



2 photon  
Installed March 17th 😊

# What types of microscopes?

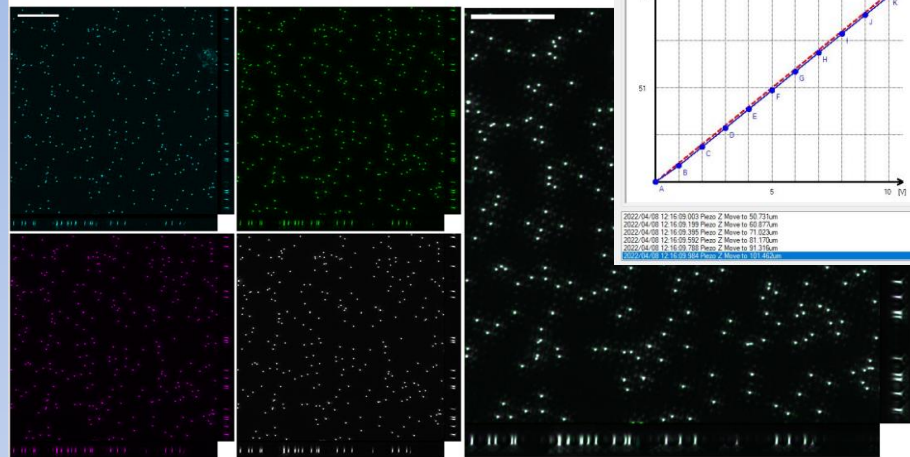
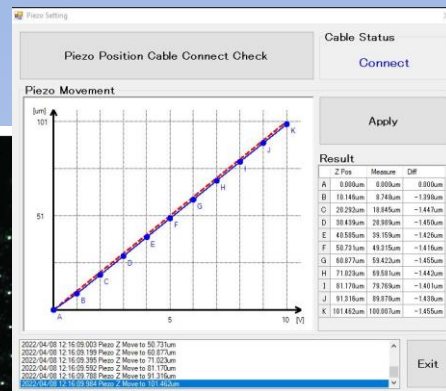
# 10 microscope bodies, many functions

- 2 single point confocals
- 3 spinning disk confocals
- 8 Widefield systems
- 1 Light sheet system
- 2 types of Super resolution
  
- 2 manual microscopes

- Primo: Micropatterning
- Laser microdissection

# Rigorous Quality Control

- QC routine for all instruments
- Internationally-recognised QC protocols



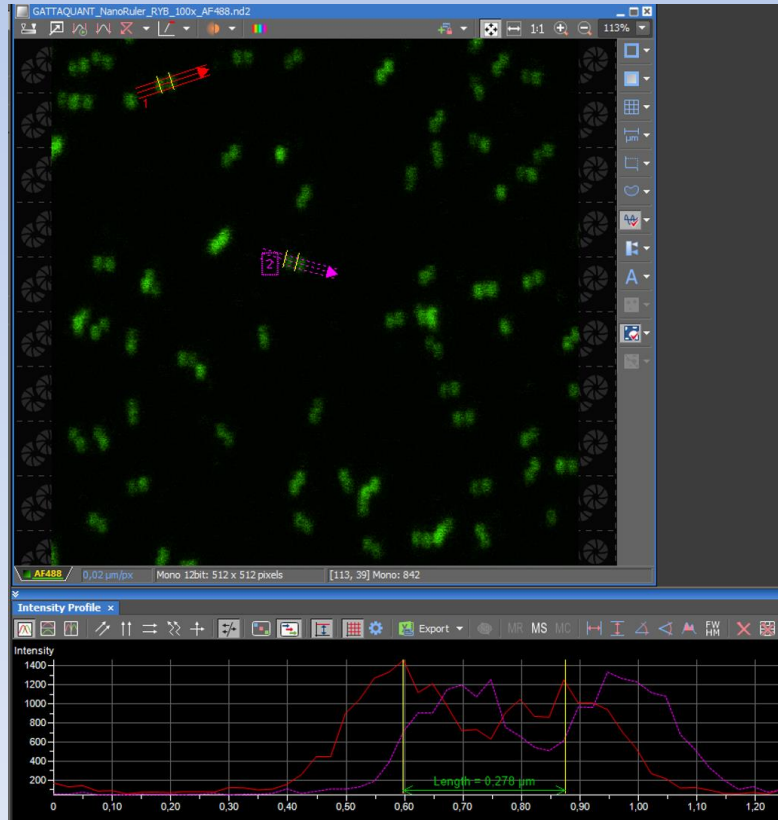
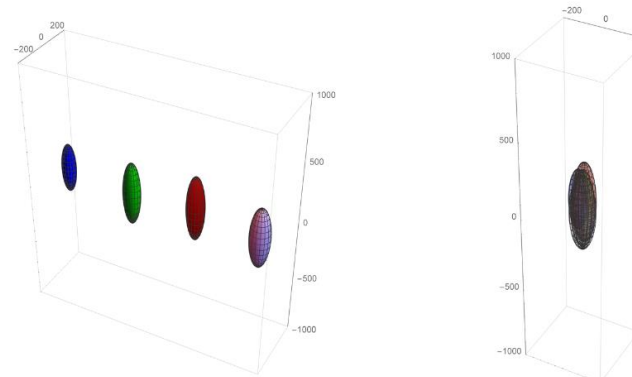
PSFj Average Analysis Results for Tetraspeck Bead Image Data  
LCI, Nikon Crest DeepSIM 17, Chromagnon, PlanAPO 60X 1.40NA, 20240305

LCI, Nikon Crest DeepSIM 17, Chromagnon, PlanAPO 60X 1.40NA, 20240305

Average PSF Dimensions

| Image Channel   | FWHM XY (nm)  |               |              | FWHM Z     |                  | Assymetry  |              | Chromatic Shifts |             |             |
|-----------------|---------------|---------------|--------------|------------|------------------|------------|--------------|------------------|-------------|-------------|
|                 | FWHM XY (max) | FWHM XY (min) | FWHM XY (ms) | FWHM Z     | FWHM Z (min/max) | XY (min)   | XY (max)     | Z                | MeanSD (nm) | MeanSD (nm) |
| Blue (N=242)    | 111.4         | ± 0.7 89.1    | ± 1.3 406.2  | ± 10. 0.89 | ± 0.03 -0.1      | ± 4. 13.3  | ± 3.8 -44.   | 0                | ± 14.7      |             |
| Green (N=32)    | 135.          | ± 0.7 118.8   | ± 1.3 522.8  | ± 10. 0.86 | ± 0.01 0.        | 0          | 0            | 0                |             |             |
| Red (N=208)     | 137.9         | ± 0.7 123.5   | ± 1.3 527.3  | ± 10. 0.9  | ± 0.01 0.1       | ± 33. -6.7 | ± 29.2 -49.8 | ± 120.           |             |             |
| Far Red (N=235) | 151.5         | ± 0.7 145.    | ± 1.3 508.2  | ± 10. 0.95 | ± 0.01 -3.       | ± 3.6 2.1  | ± 3. 30.9    | ± 1.7            |             |             |

Model of Average PSF Dimension and Chromatic Shift Parameters  
LCI, Nikon Crest DeepSIM 17, Chromagnon, PlanAPO 60X 1.40NA, 20240305



# Prices

- **Pedagogy-based training** 9,000 SEK (Equivalent to 10,800 SEK at BIC 😊)
  - Enabling researchers to make educated choices: reliability and reproducibility.
    - Onboarding meeting: Tons of tips from sample preparation to image analysis.
    - Hand-on training 4 sessions of 3h. Ample time to practise alone.
    - 1 free session 3h the following week: data collection.
    - Image analysis session.
- Usage
  - **Hourly fees**
    - 330 SEK /h office hours. 165 SEK/h after hours.
    - 6h imaging: 1485 SEK (1800 SEK at BIC 😊).
  - **Memberships** for heavy users (1 month to 1 year)
  - **Imaging-by-staff** service 1330 SEK/h, including Material and Methods.
- **Free post-training support** for all (300 SEK/h at BIC 😊).
- Excellent microscope access.

# Which samples?

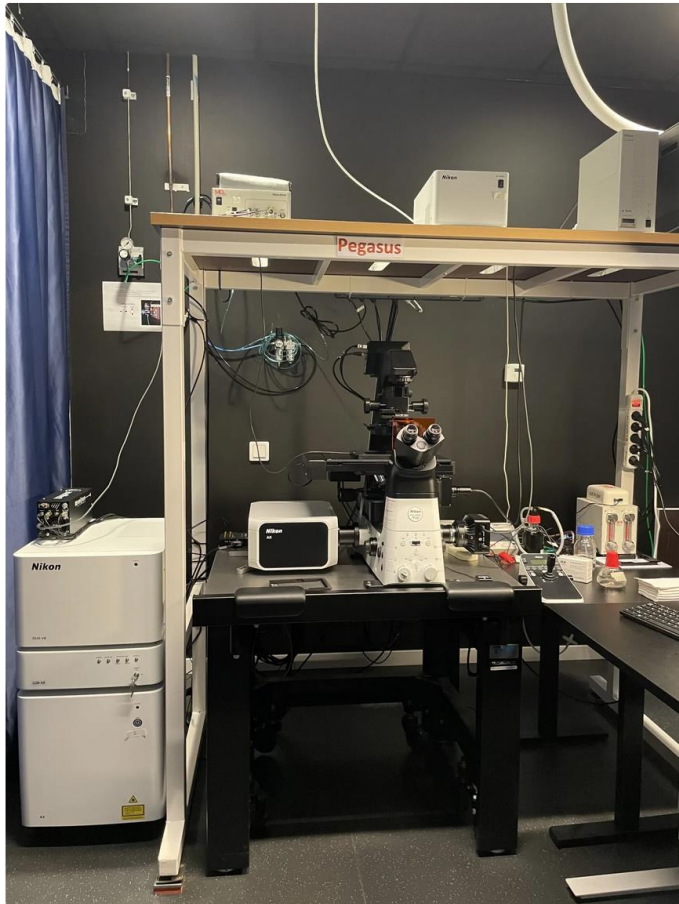
# BSL1 or BSL2



The Live Cell Imaging core facility

# Live or fixed

## Pegasus



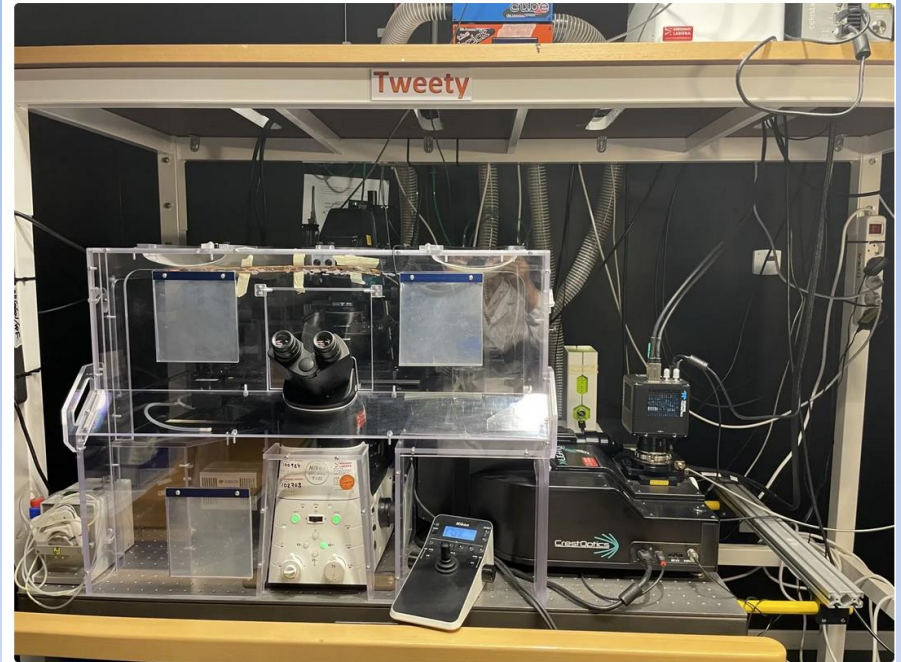
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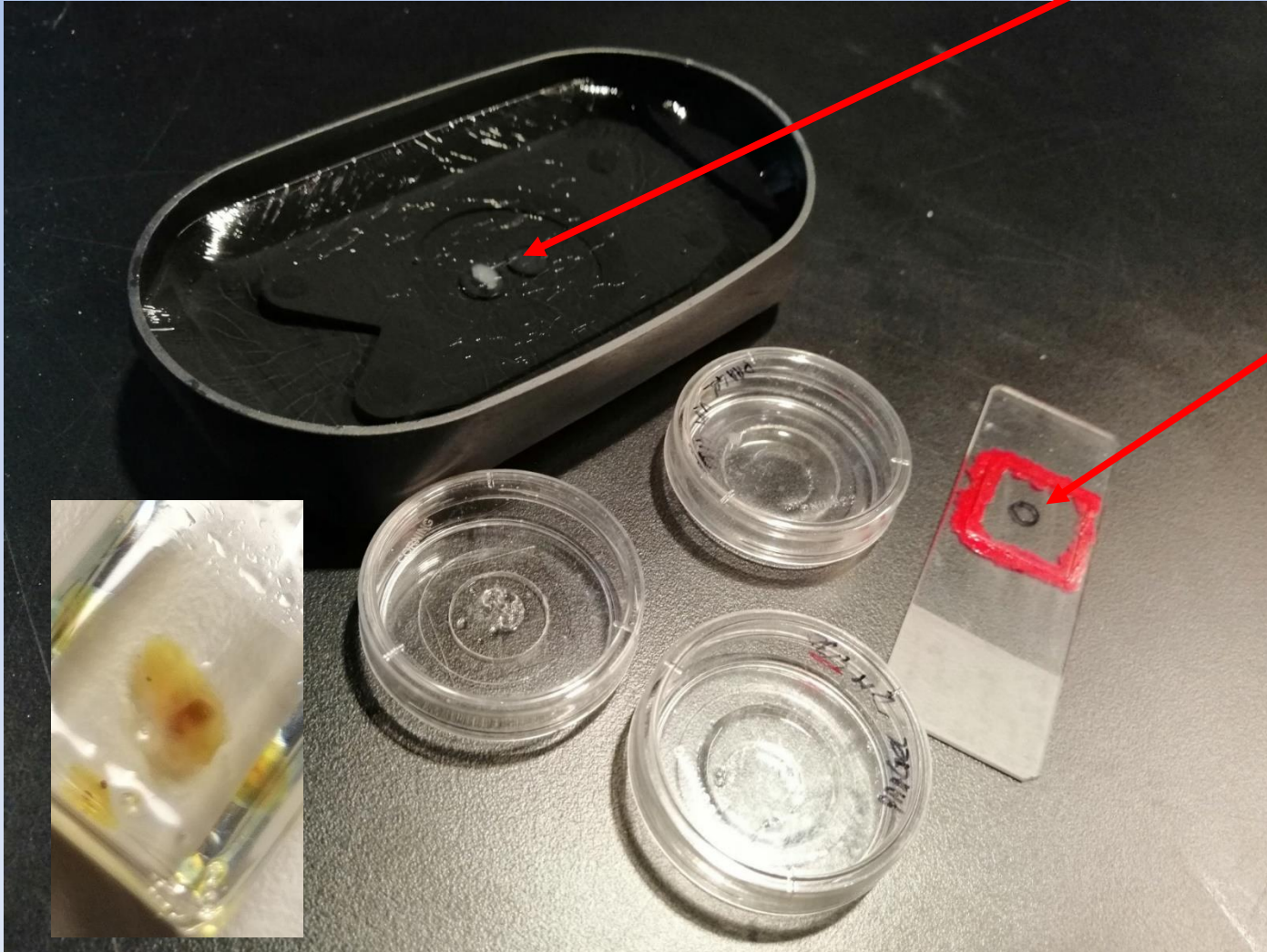
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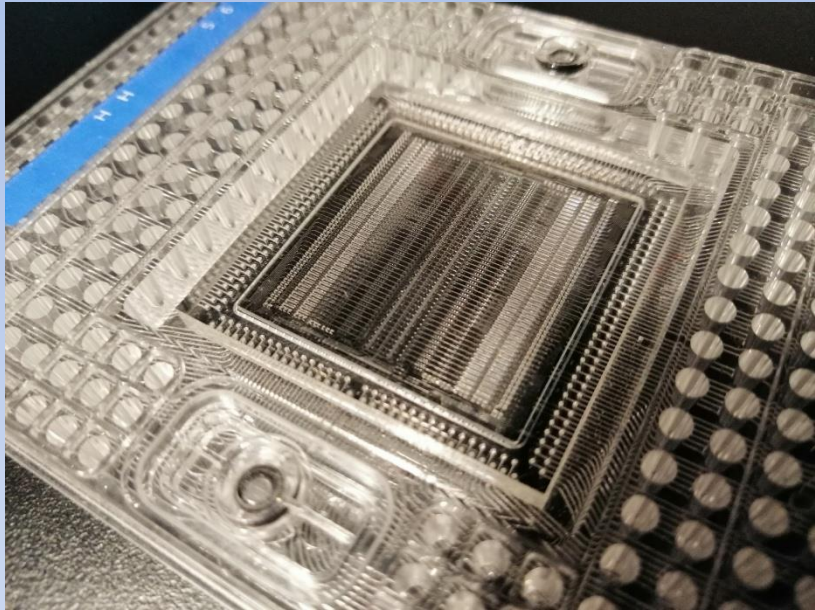
# Tiny to very large

Very large tissues  
 $\text{cm}^3$

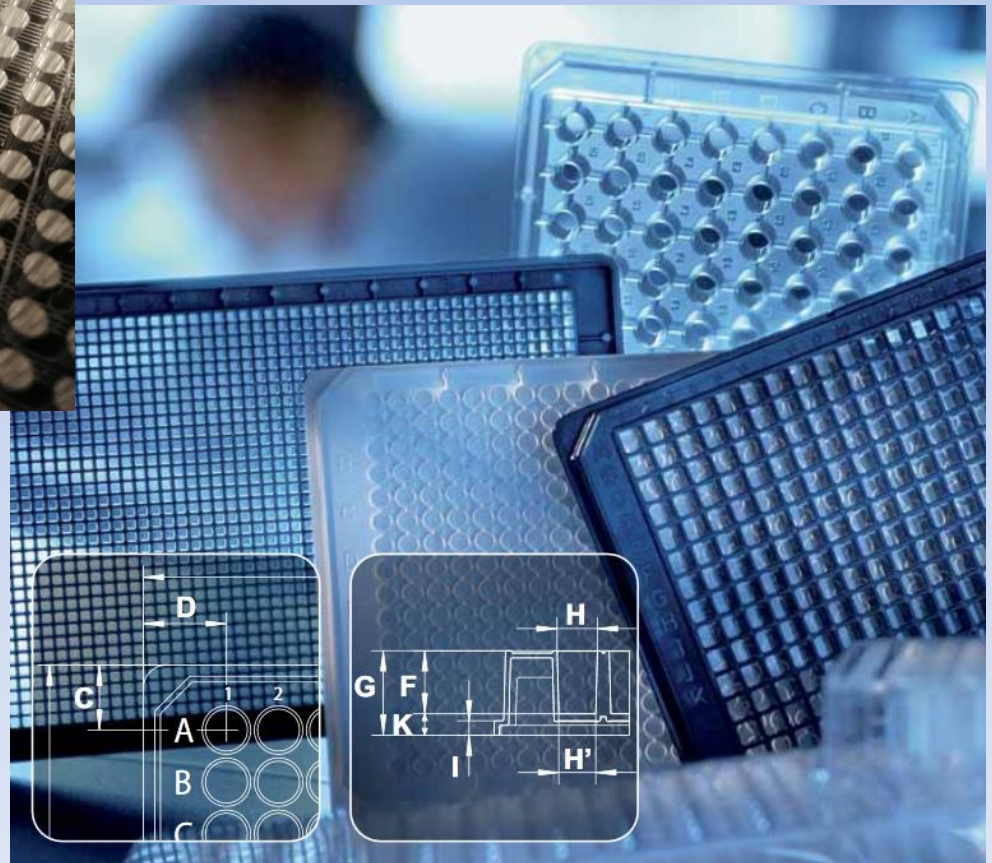
Super tiny molecules  
nm



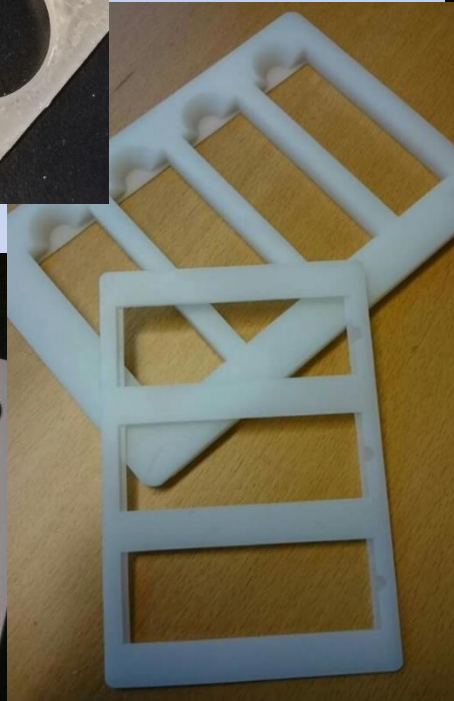
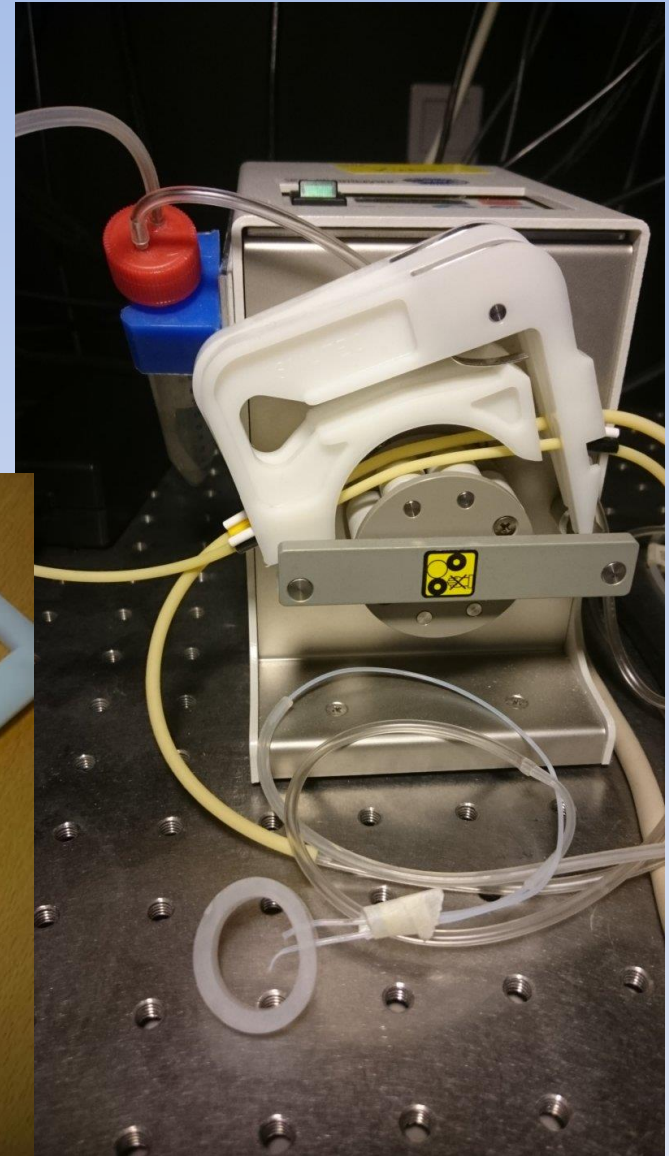
# Any sample carrier



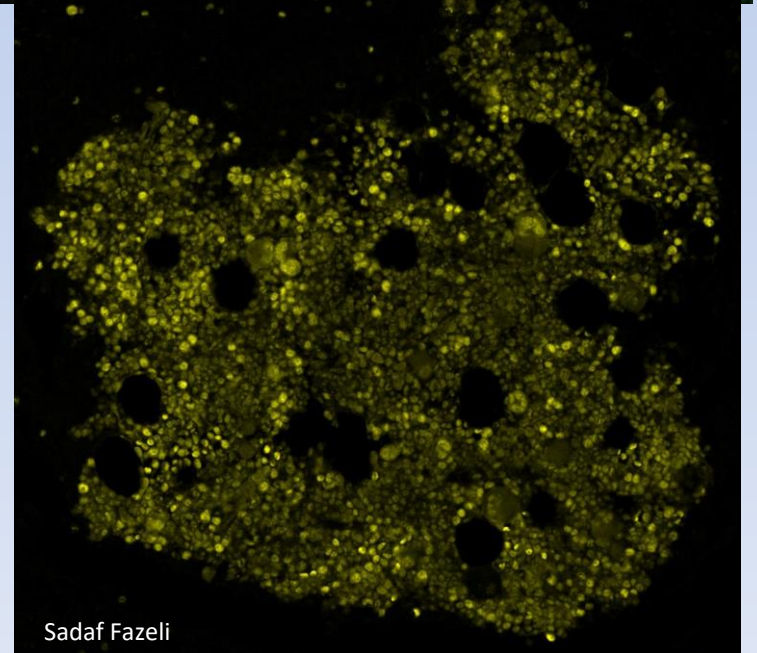
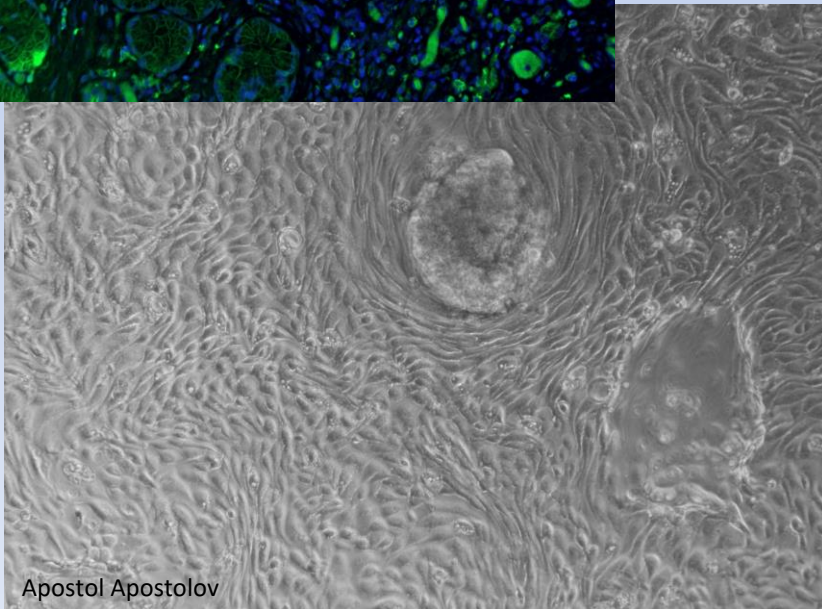
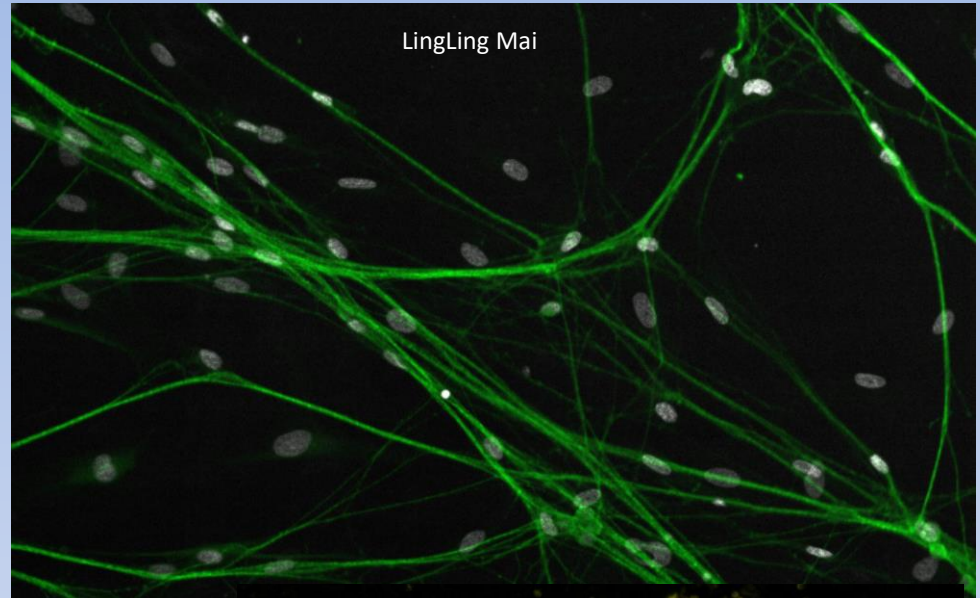
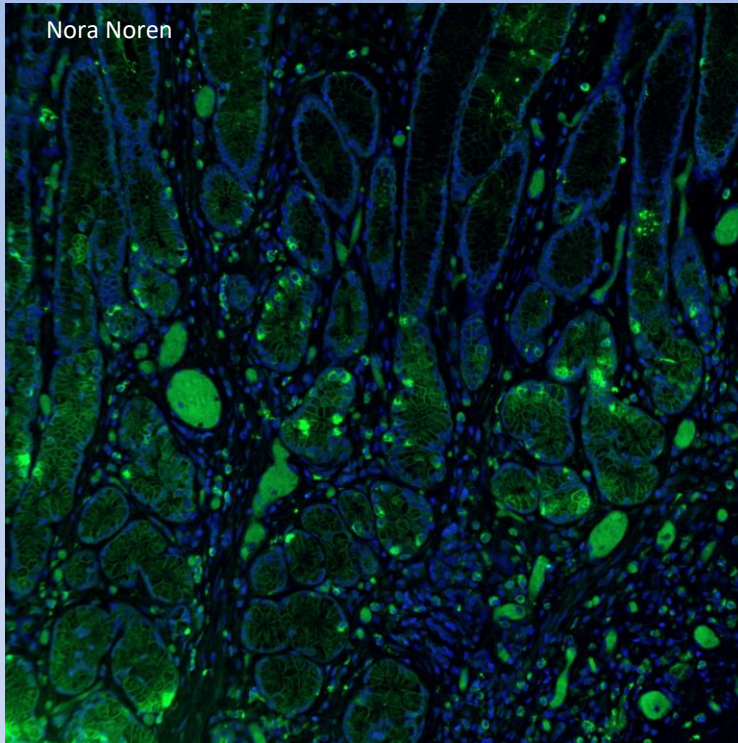
Multiwell plates up to 1536 wells



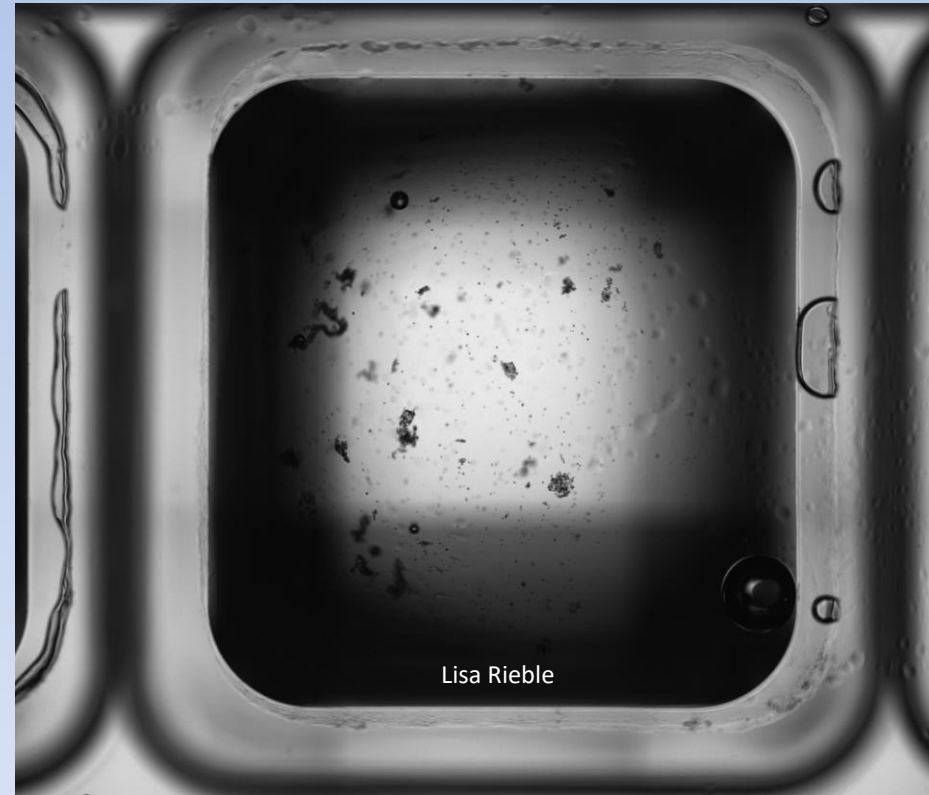
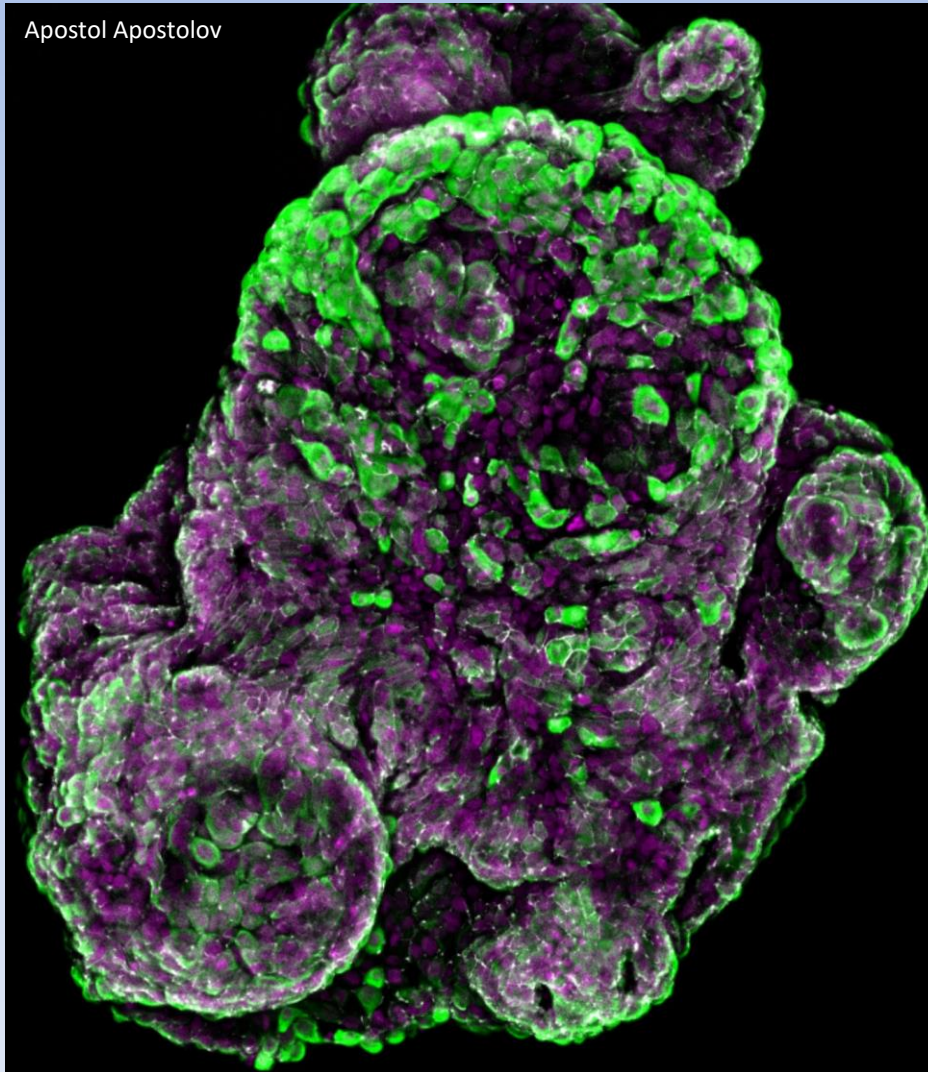
# Custom-made gadgets for microscope geeks 😊



# Cells, tissues, tissue models, cells in or on gels

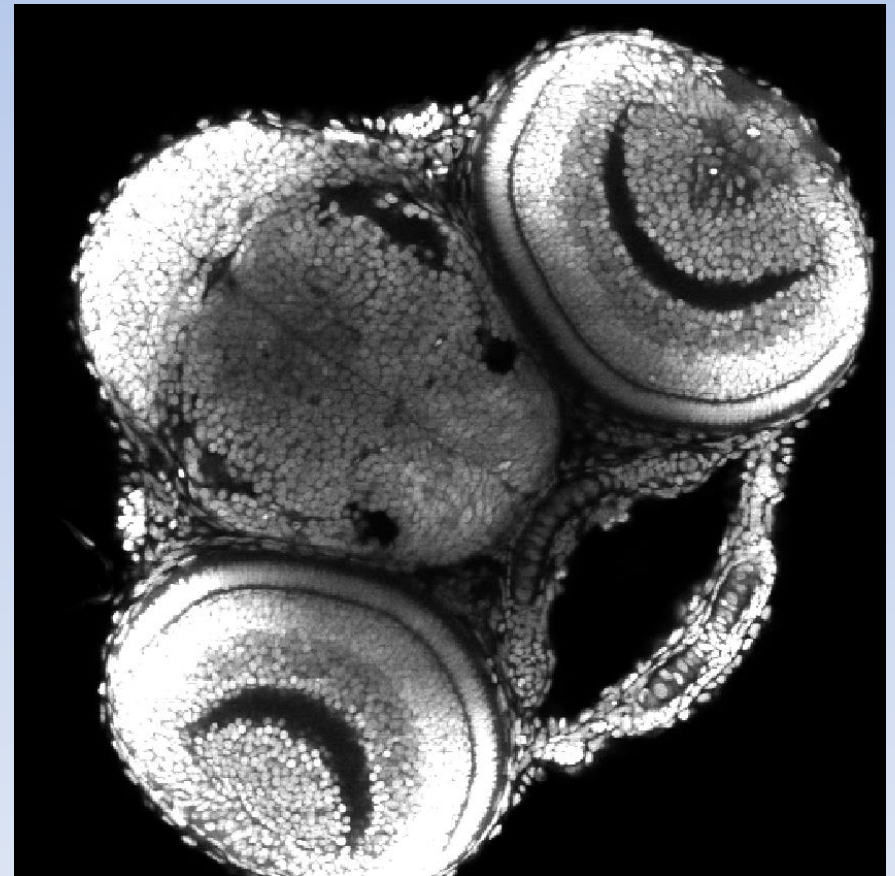
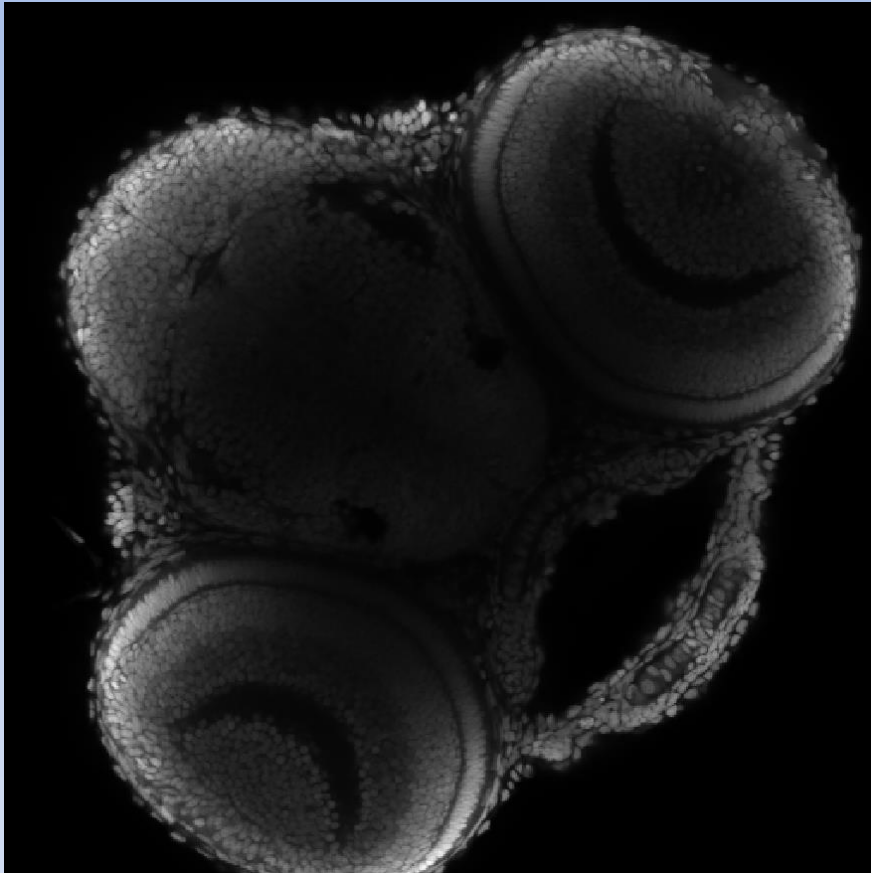


Organoids/spheroids, fossil plants, dye solution,  
DNA strand on chip, etc  
Just name it! 😊



Lisa Rieble

# Sample preparation expertise



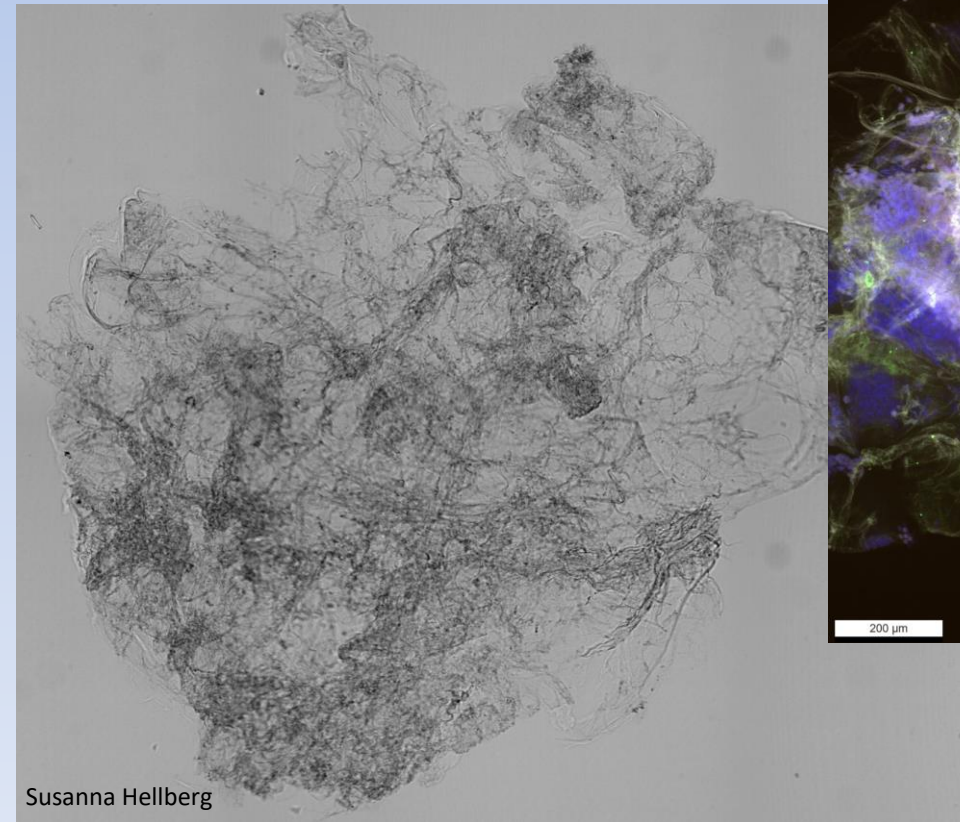
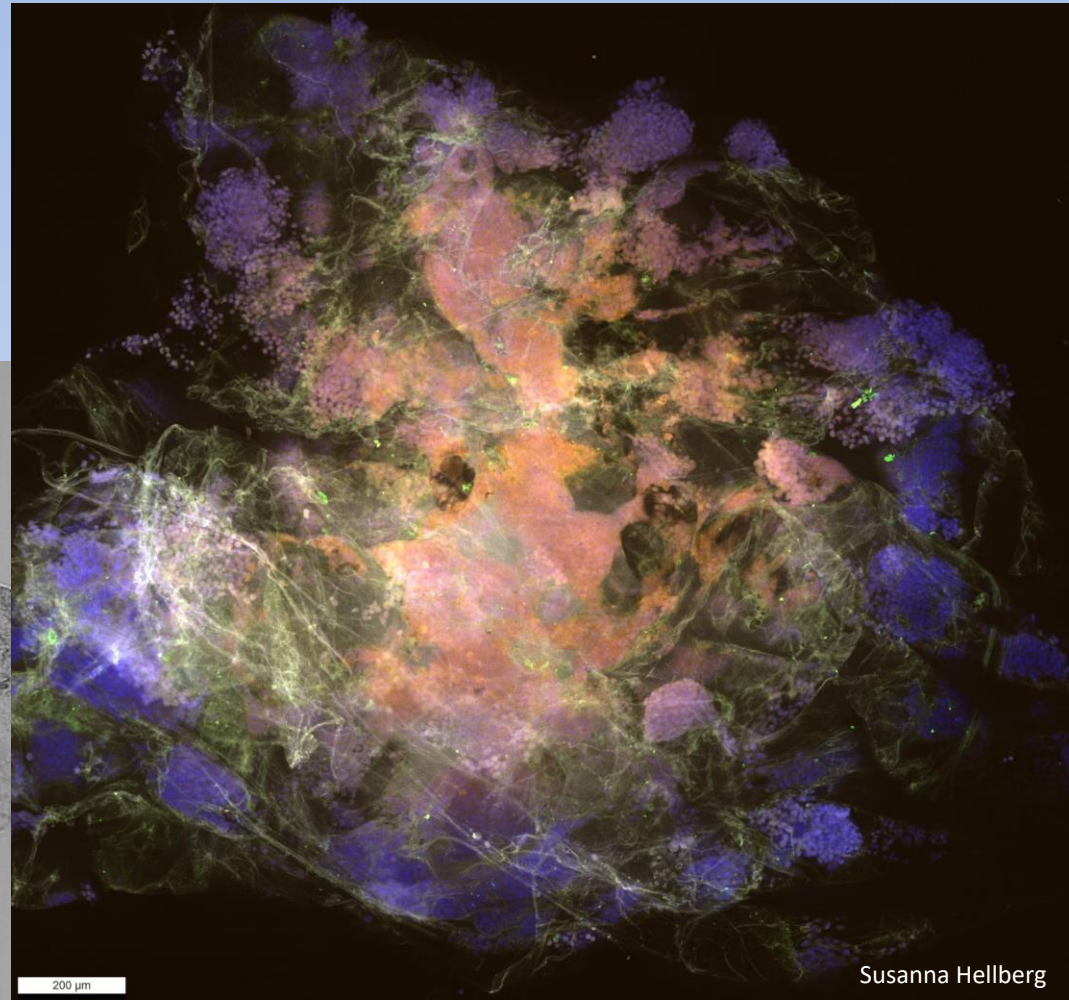
Personalized support

Gilbert Lauter

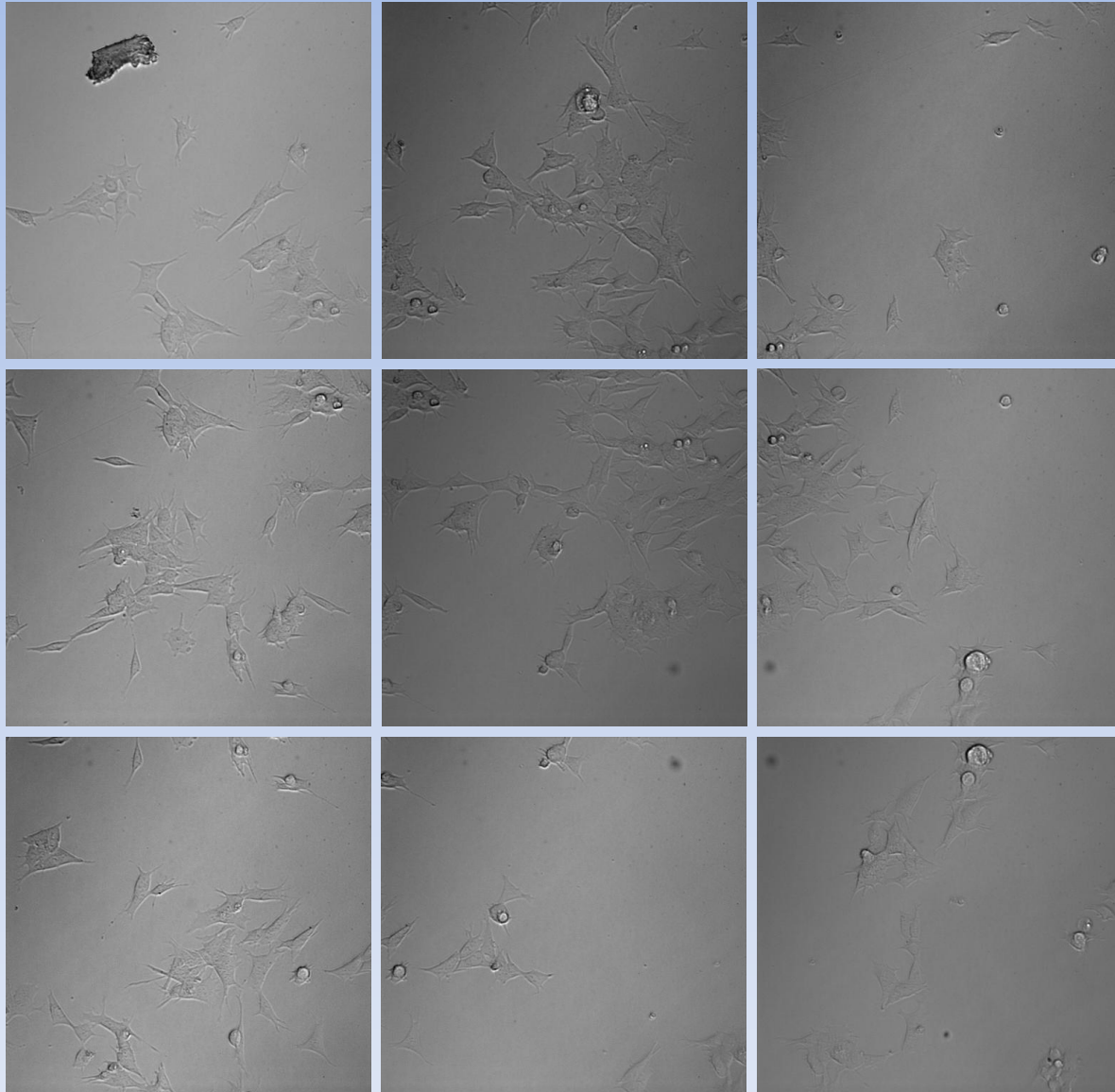
The Live Cell Imaging core facility

# What can our microscopes do?

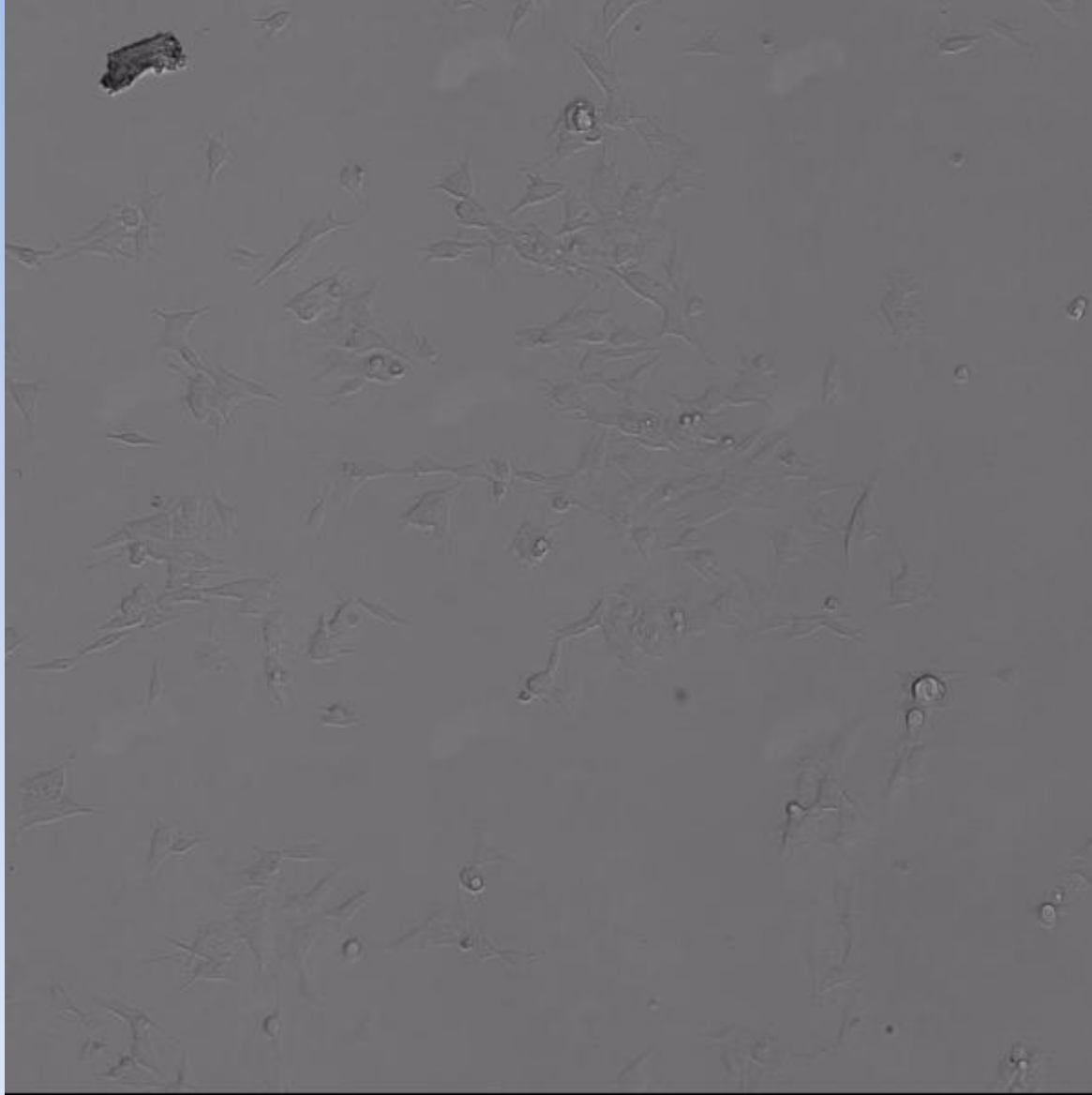
# Transmitted light, fluorescence



# Full automation: tiling



# Time lapse: live cells in culture

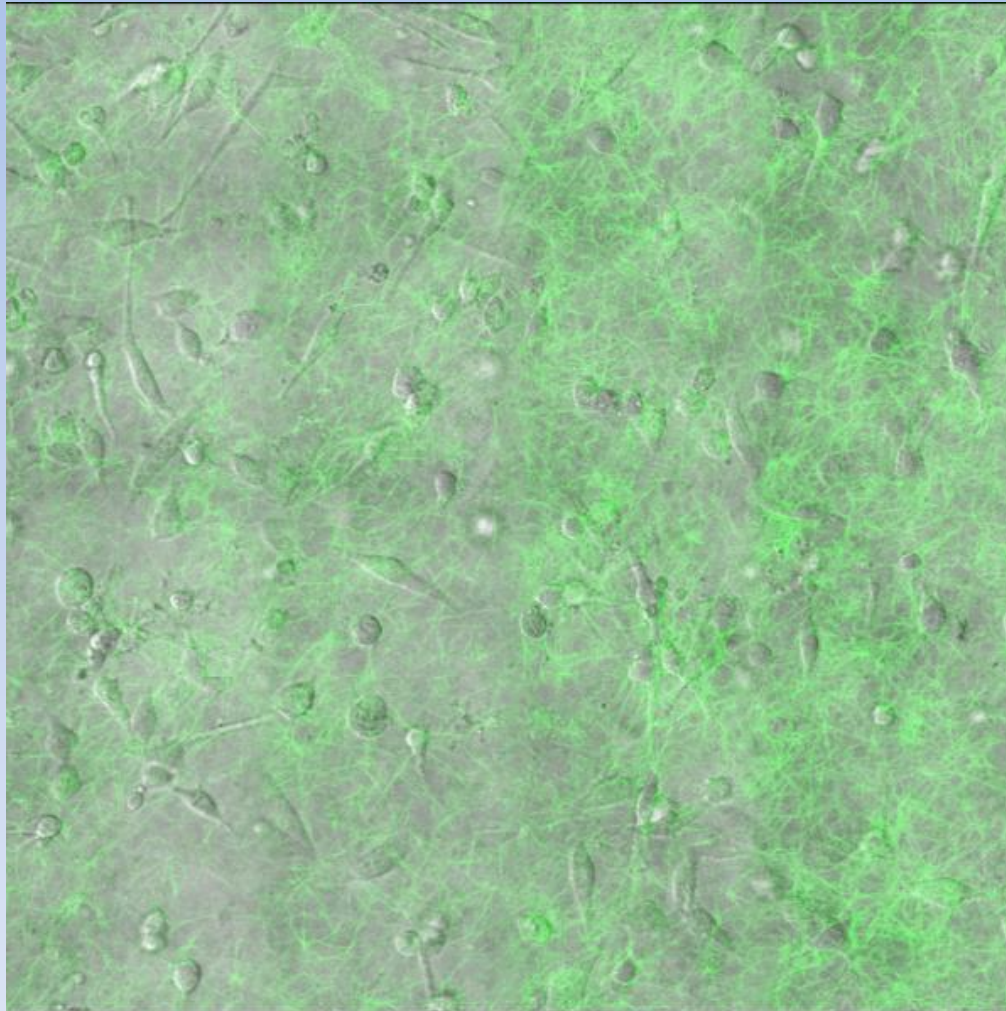


Kristiina Tammimies

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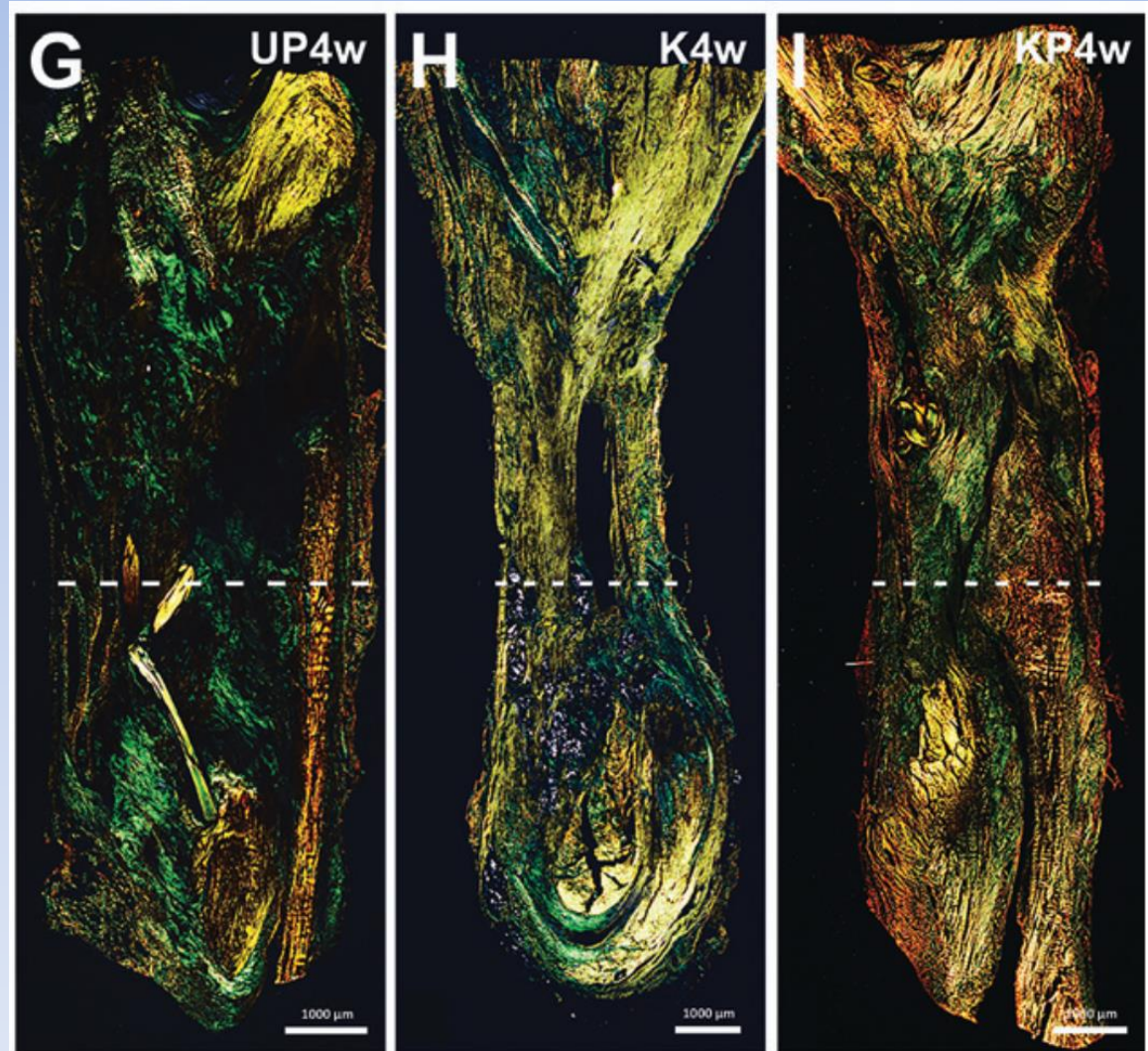
# Time lapse: live 3D tissue models

Up to 5 days



# Polarized light microscopy - Collagen fiber organisation

- Tendon tissue
- Picrosirius red
- Birefringent collagen
- Polarized light microscopy

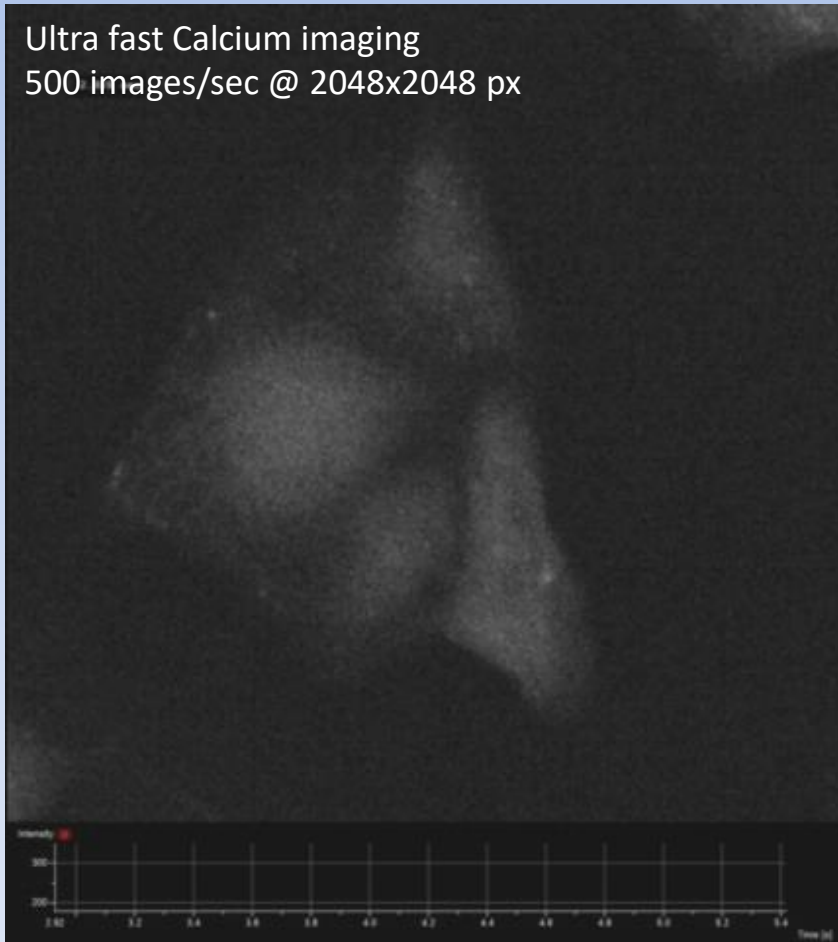


Pulzato Cury et al, Am. J. of Sport Medicine, 2019

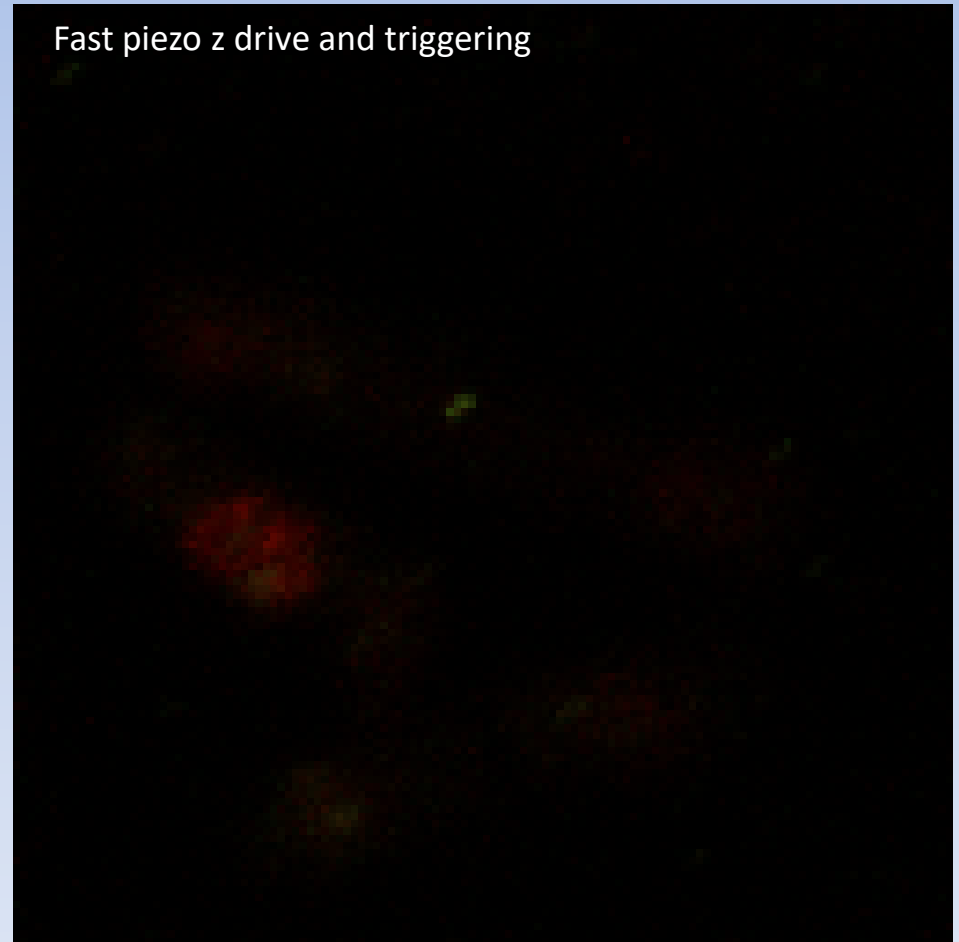
# Fast imaging - Large/thick samples, many samples

## Triggering, piezo z, resonant scanner

Ultra fast Calcium imaging  
500 images/sec @ 2048x2048 px



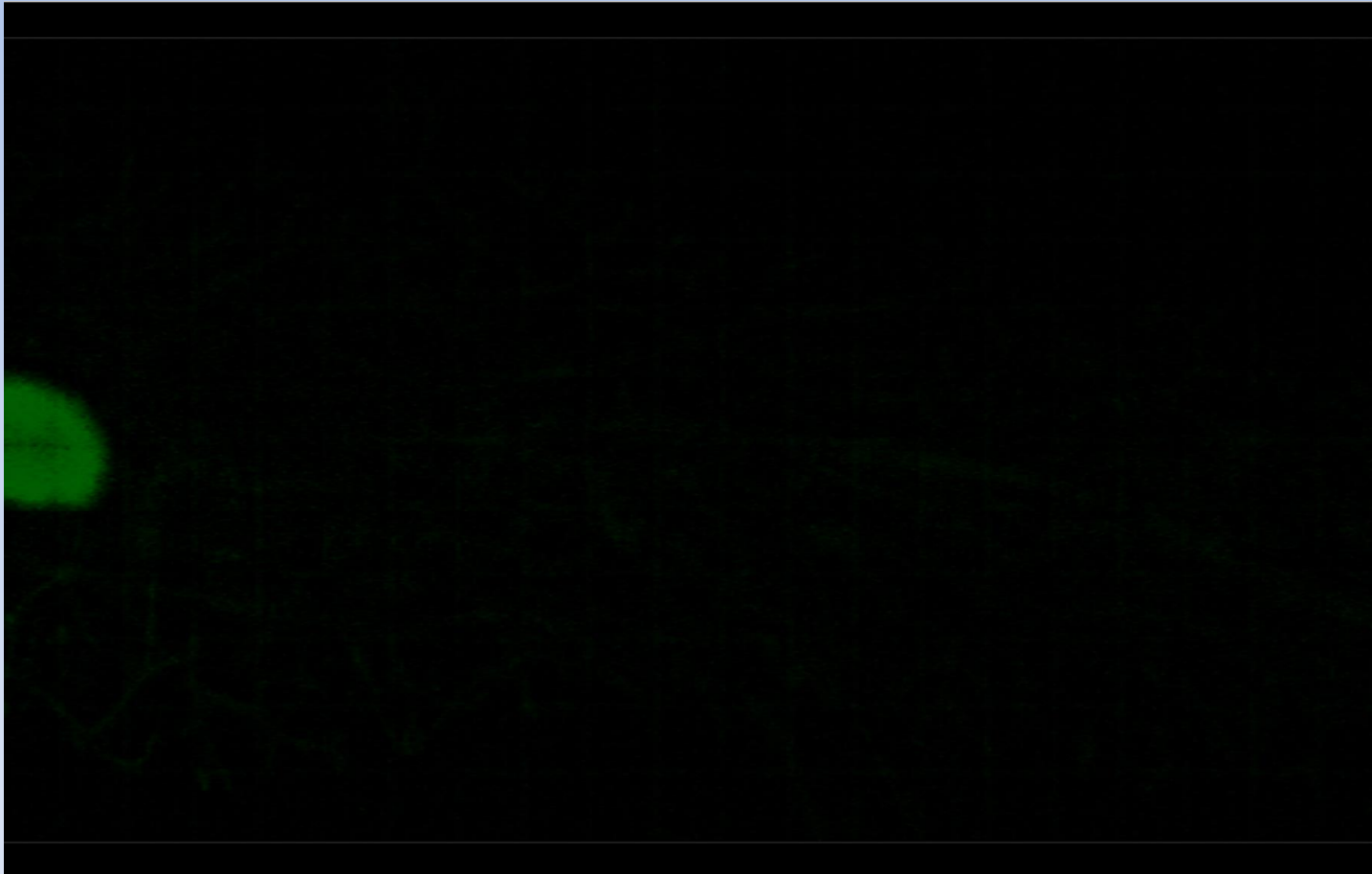
Fast piezo z drive and triggering



Alejandro Hidalgo-Gonzalez; Babett Steglich

# Fast confocals - Optical sectioning

## Spinning disks and sensitive cameras



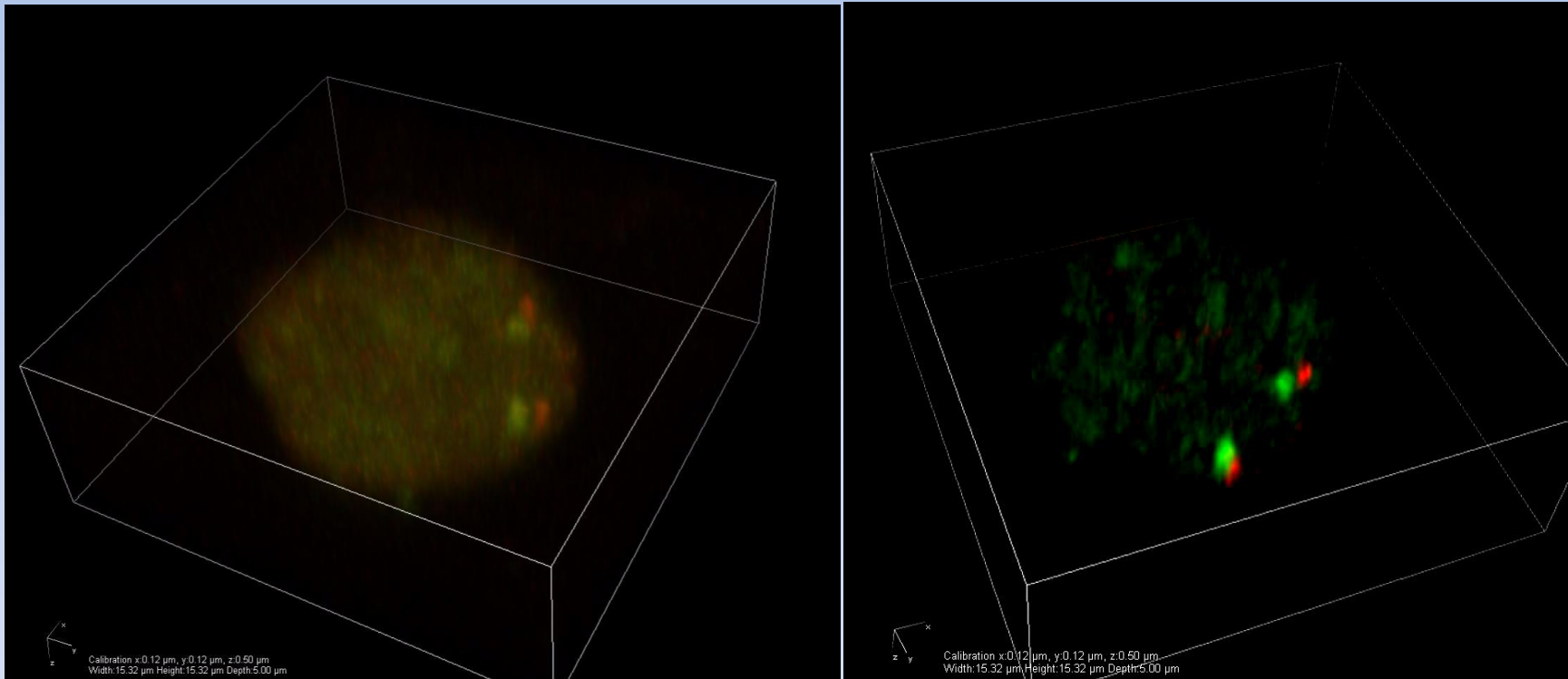
# Tiles, z, multicolour, time



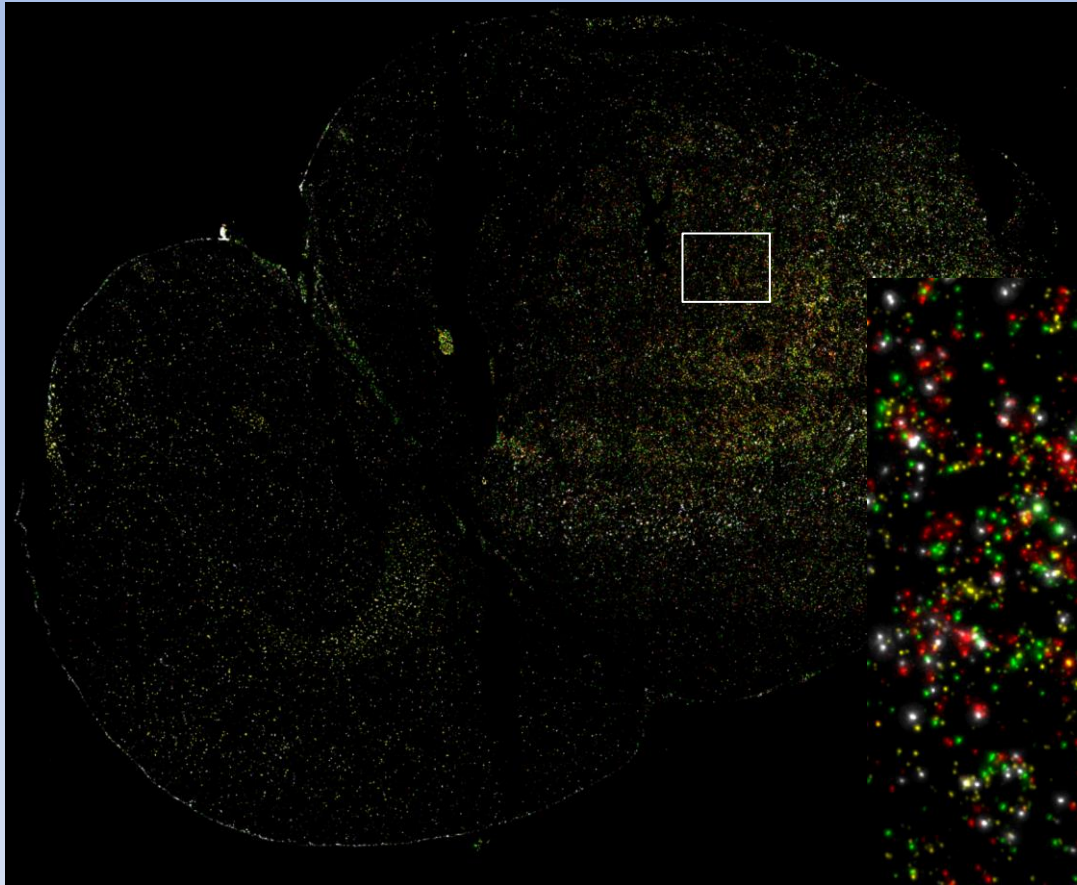
Babett Steglich

# Multiplexing - Many molecules

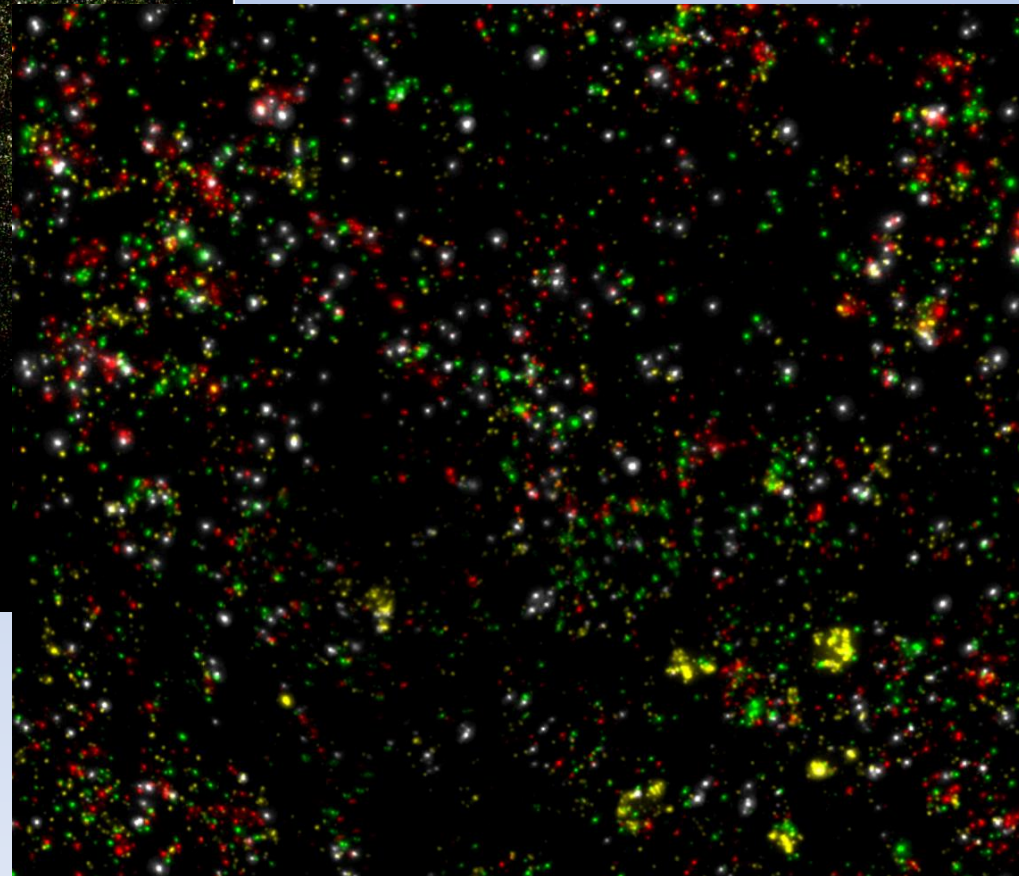
## Spectral detectors, 7 lasers



# Multiplexing: 6 fluorophores in whole brain section



Mats Nilsson's lab  
Highly multiplexed targeted ultra-deep  
next generation sequencing



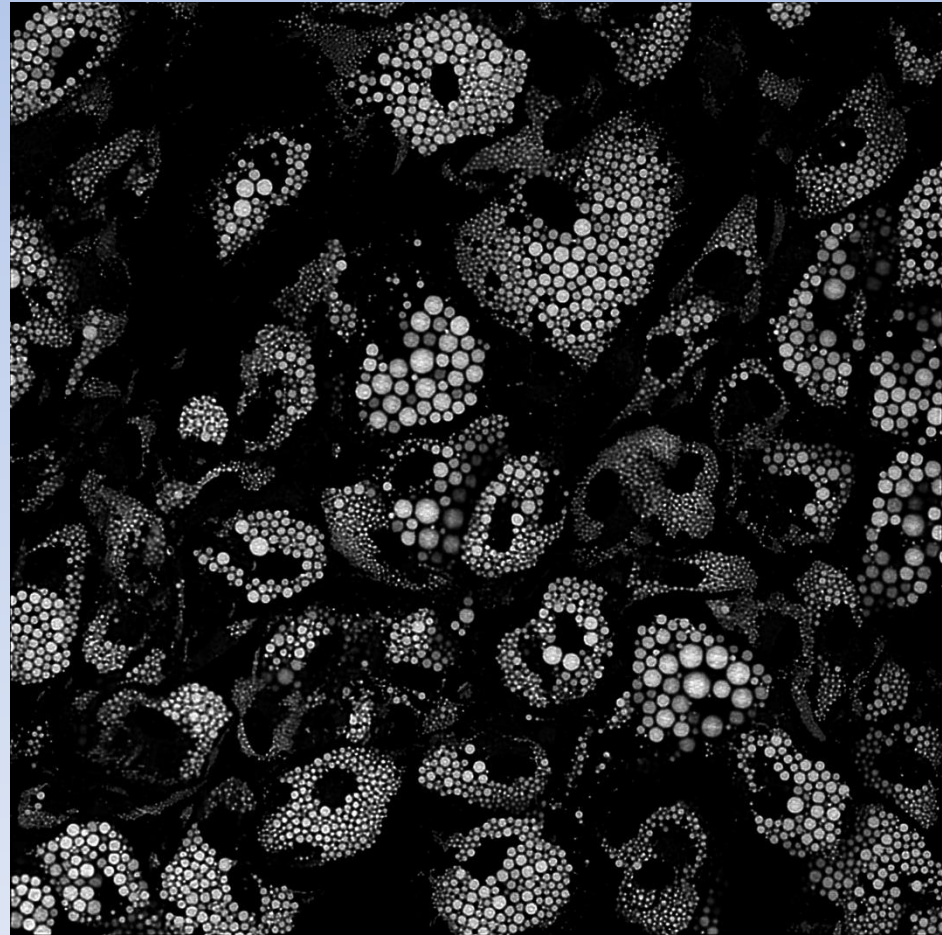
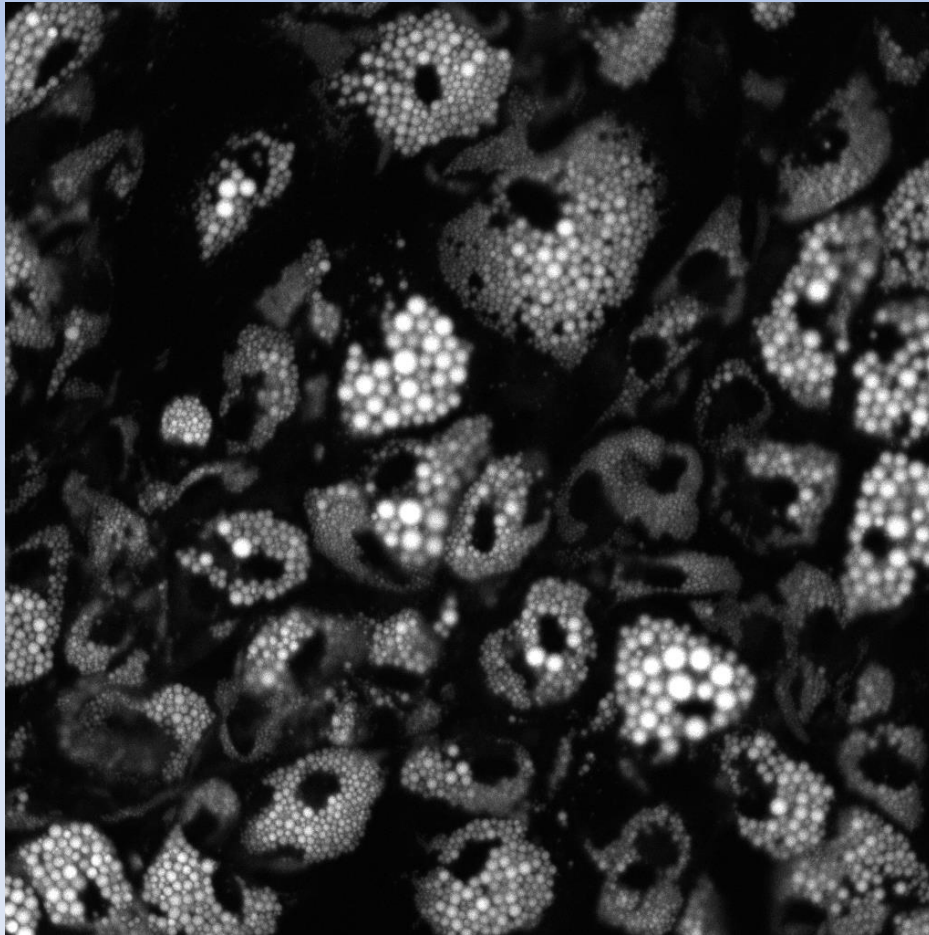
# Super resolution – More details

## DeepSIM

- Structured illumination microscopy
- Doubles the resolution of a confocal (100 nm)
- Fast and deep
- Fixed or live samples

Spinning disk confocal

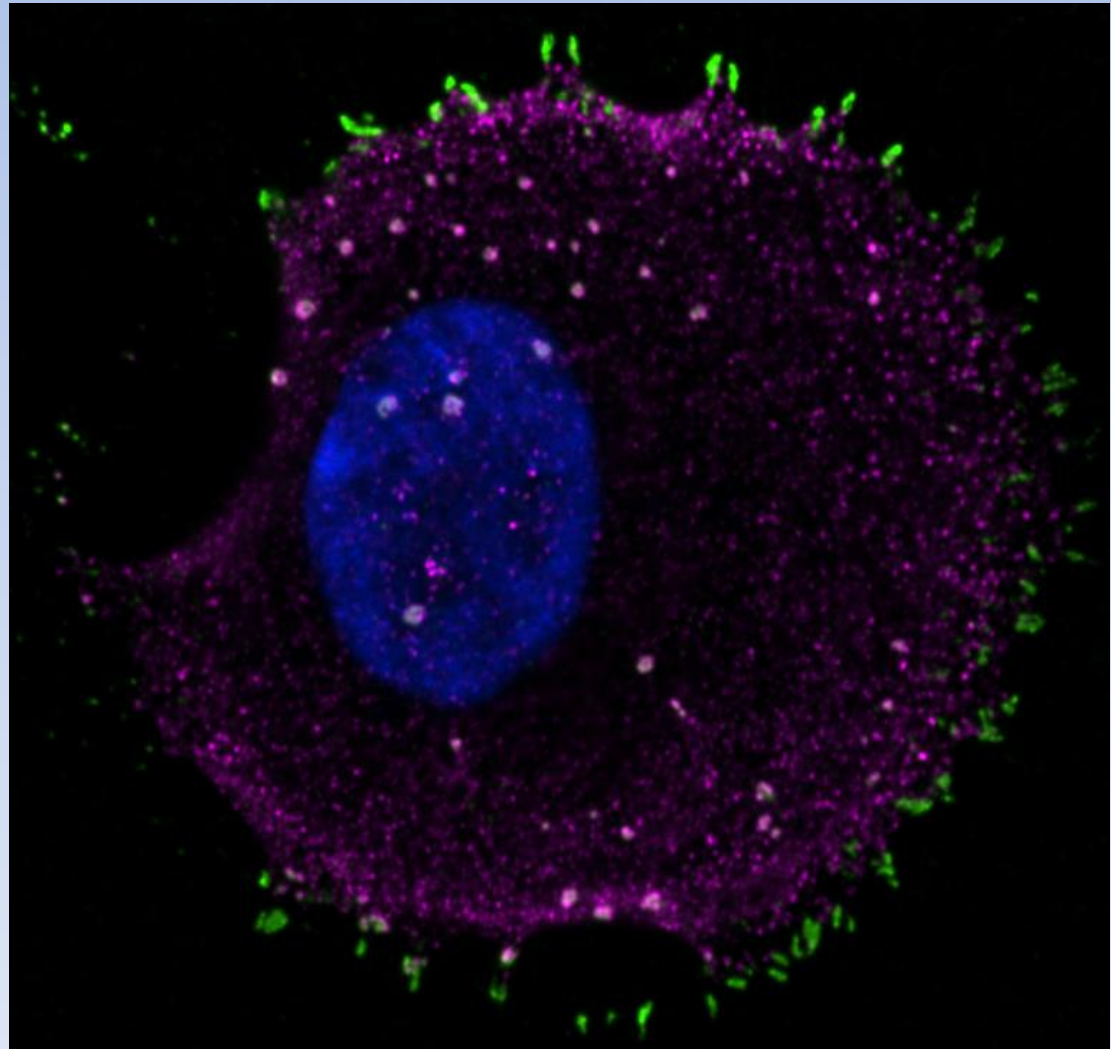
SIM



# Super resolution – More details

## NSPARC

- Image Scanning Microscopy (NSPARC)
- Doubles the resolution of a confocal (100 nm)

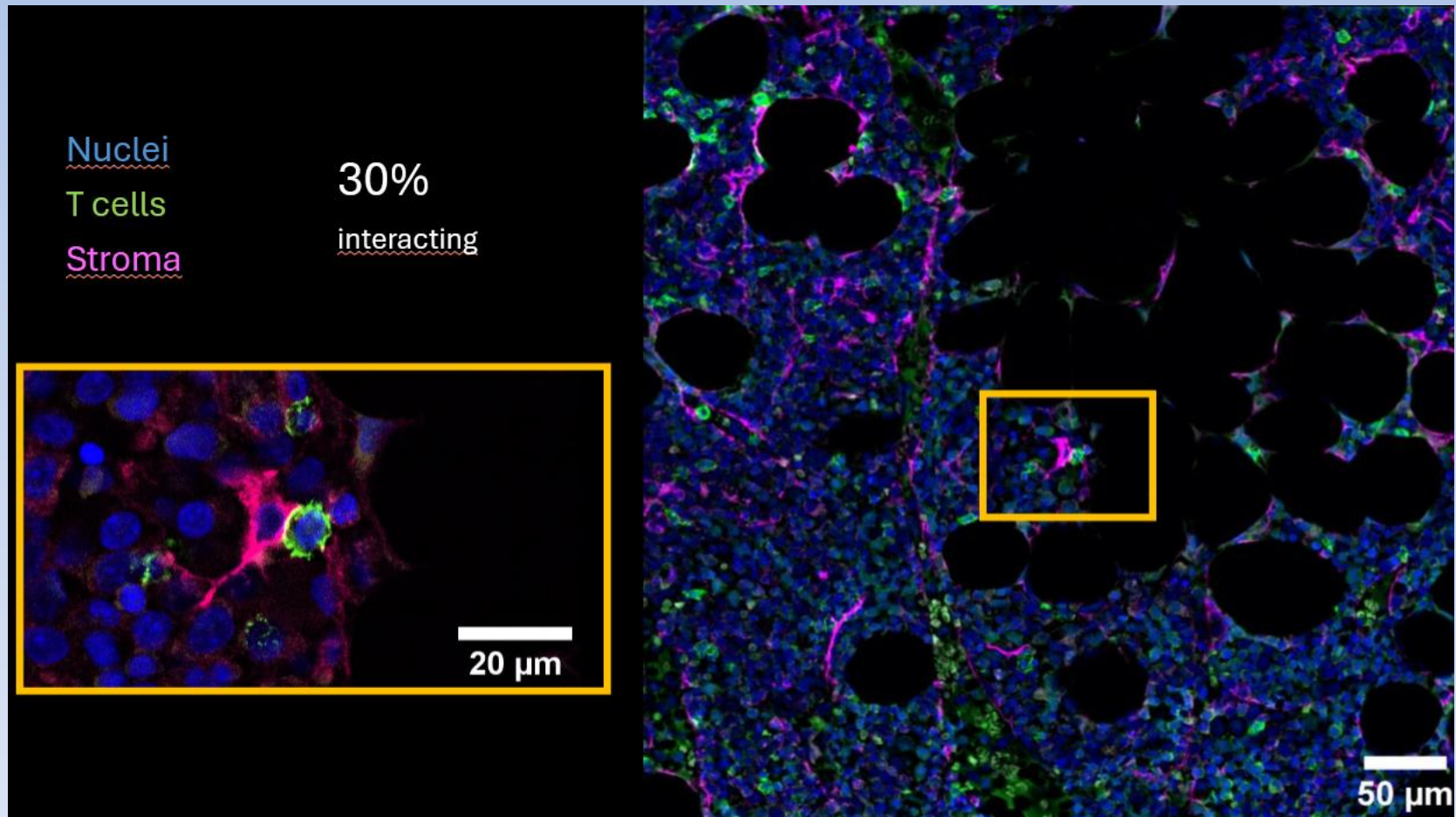


Lokesh Patil, Reticular adhesions

# Super resolution – More details

## NSPARC

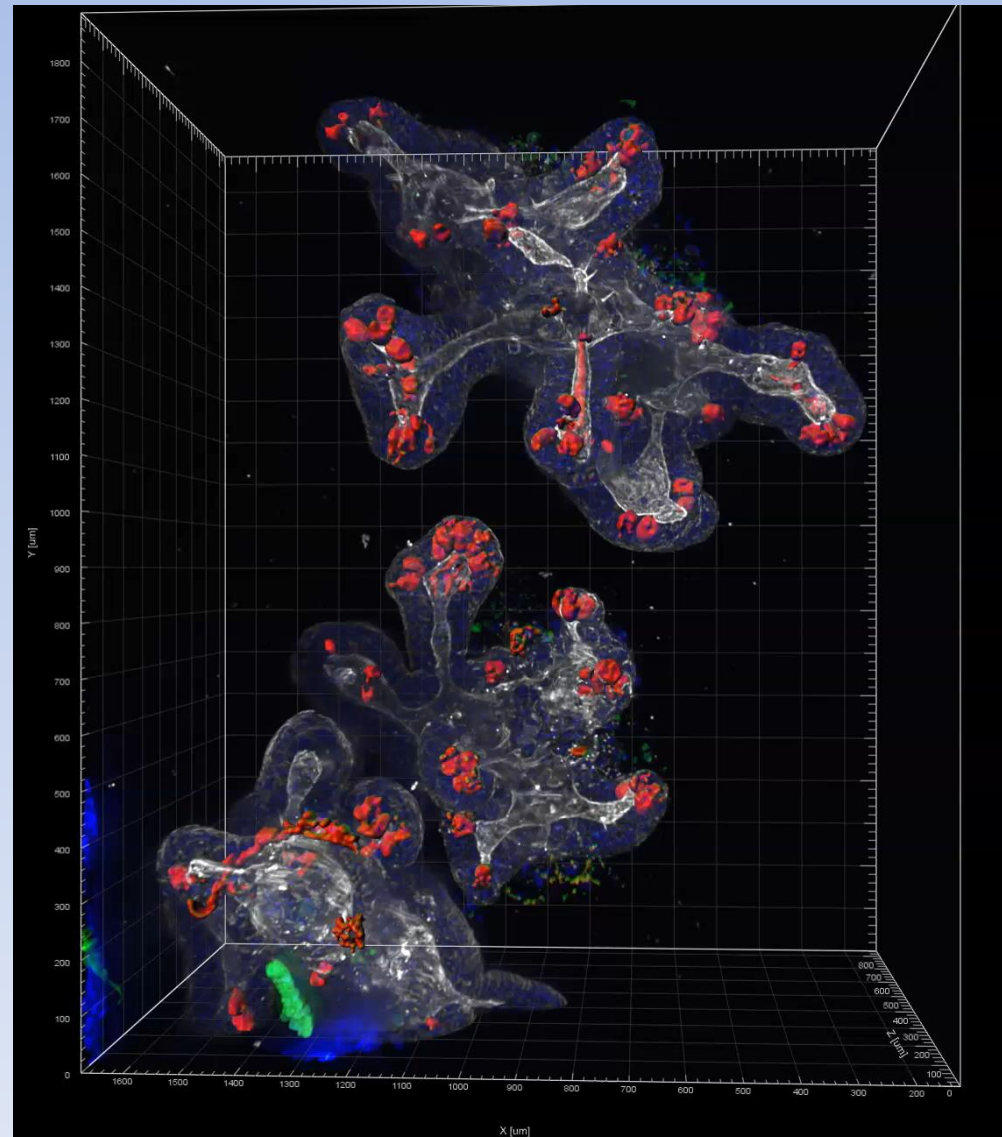
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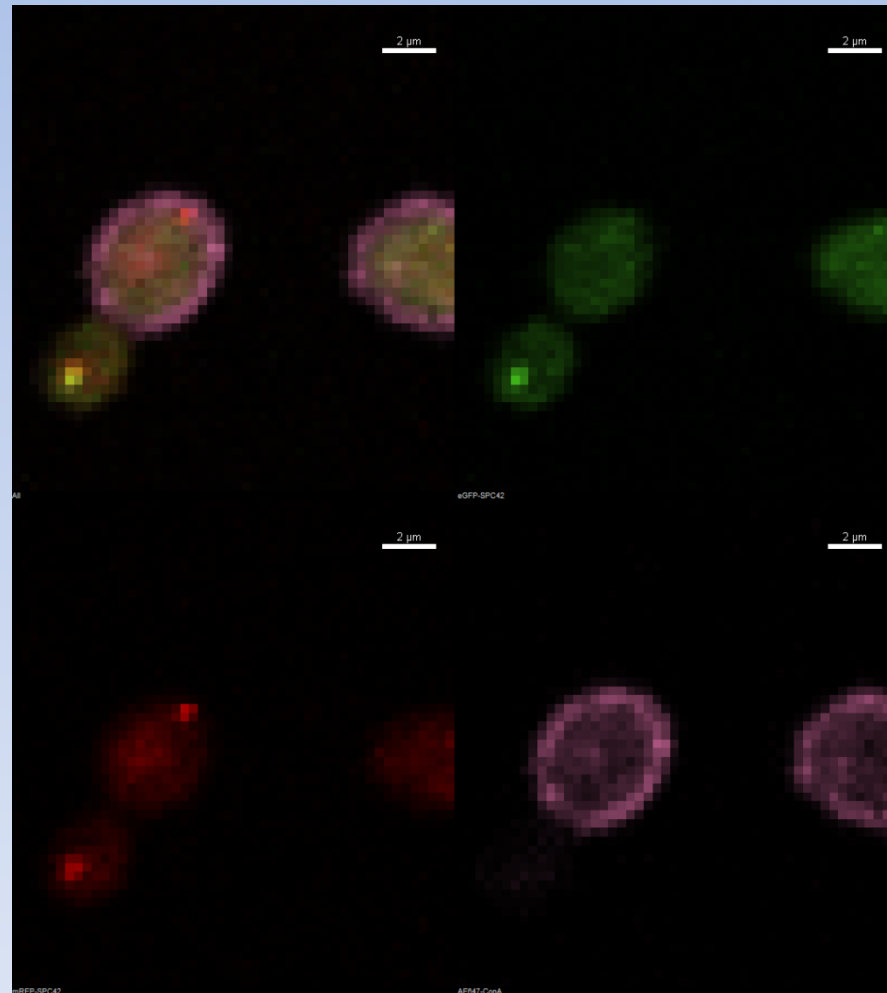
# Very large samples: Airy beam light sheet

- From hundreds of  $\mu\text{m}^3$  to  $\text{cm}^3$
- Fixed or live samples
- Excellent resolution
- Large field of view

Organoids  
1.9\*1.7\*0.9 mm



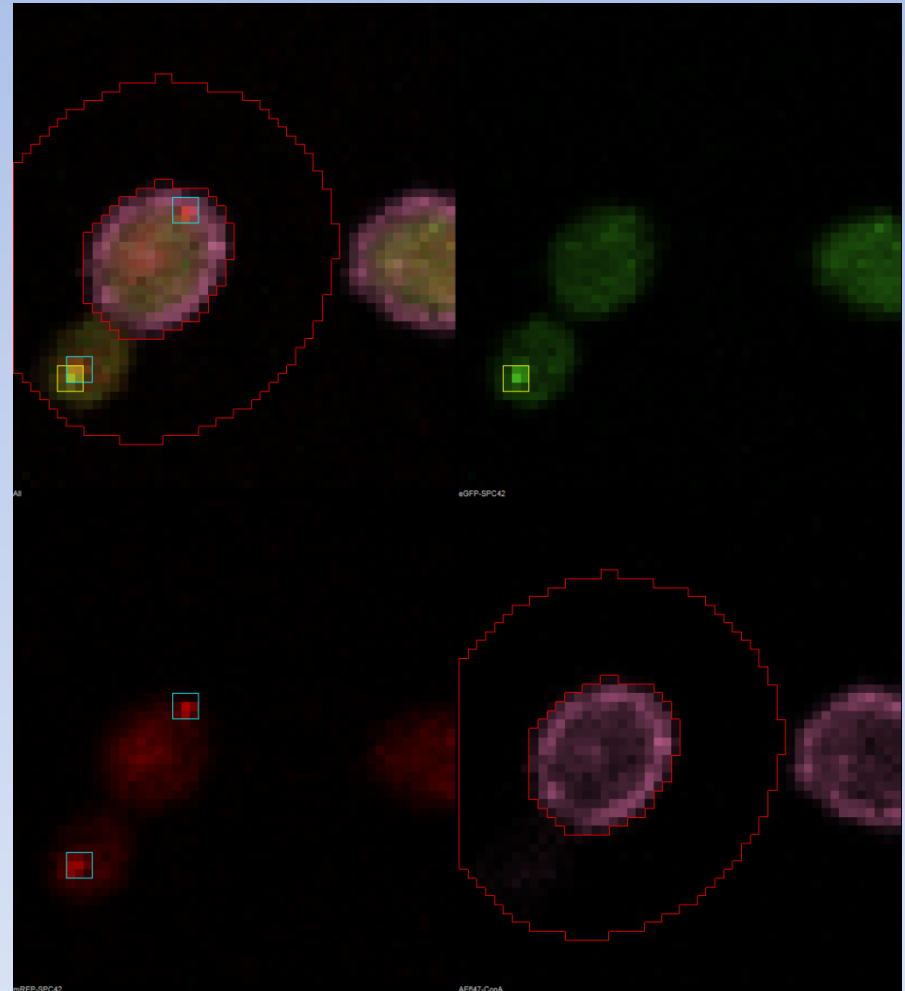
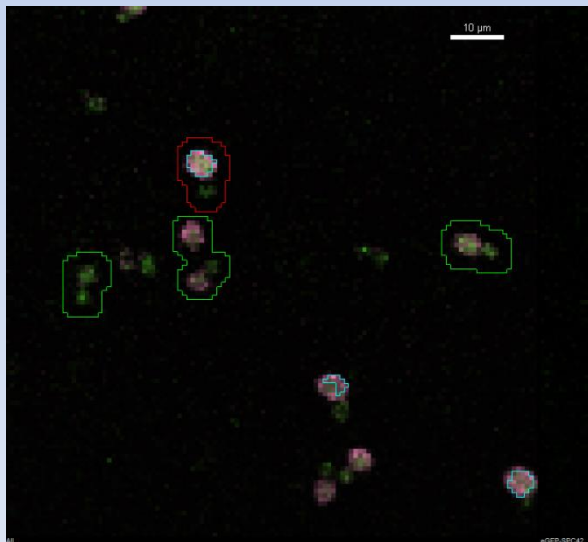
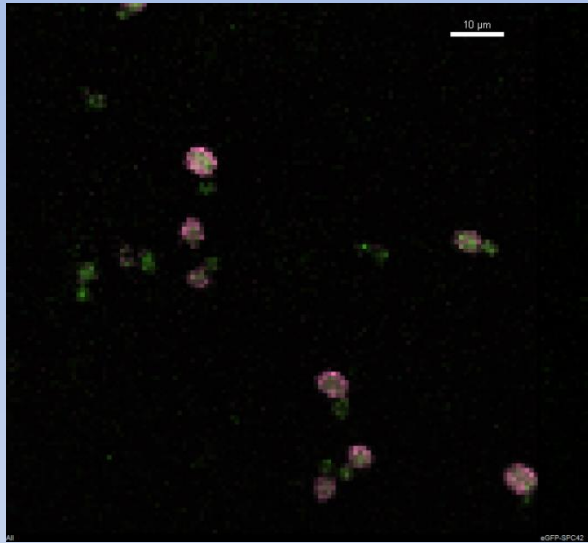
# Smart microscopy: JOBS



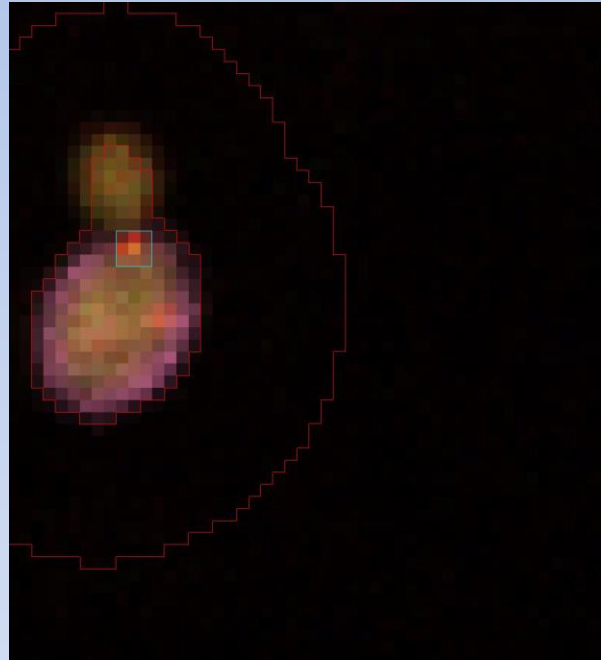
Alexander Julner

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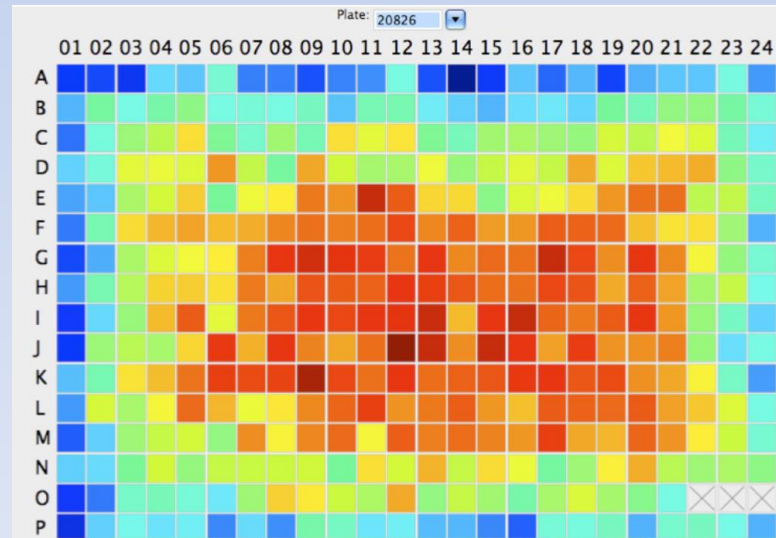
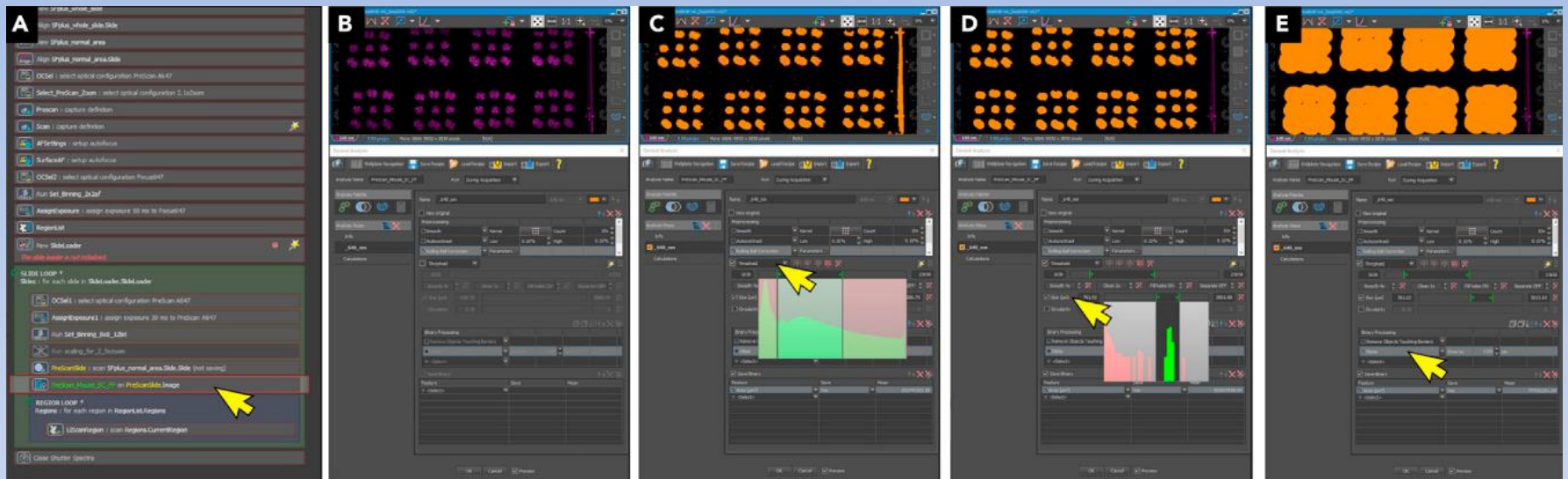
# Smart microscopy: JOBS



# Smart microscopy: JOBS



# High content imaging with heat map

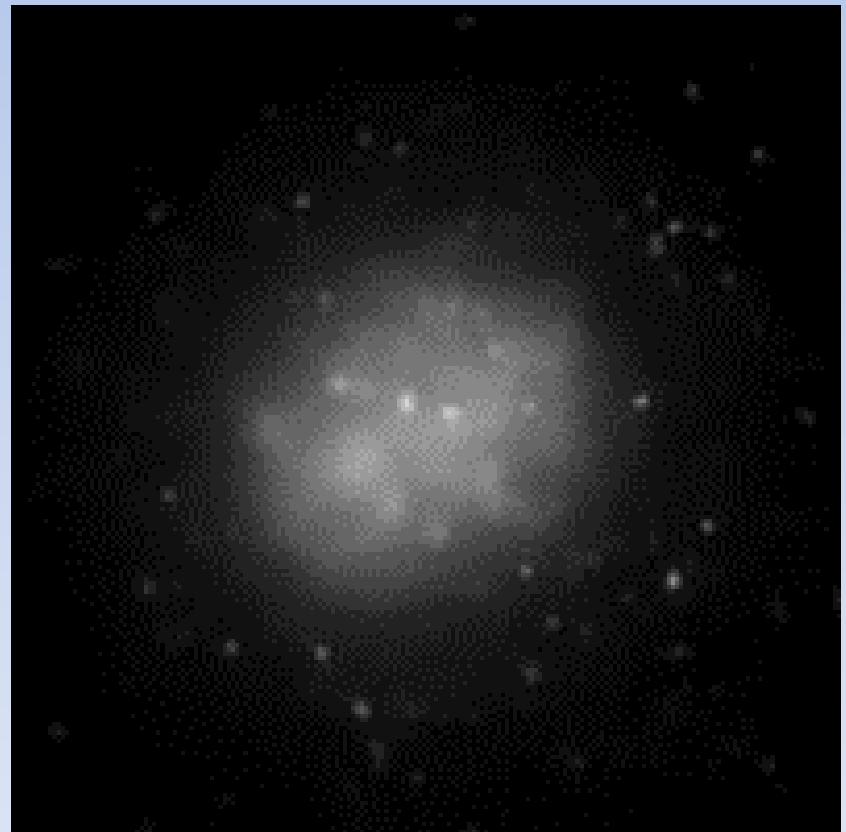
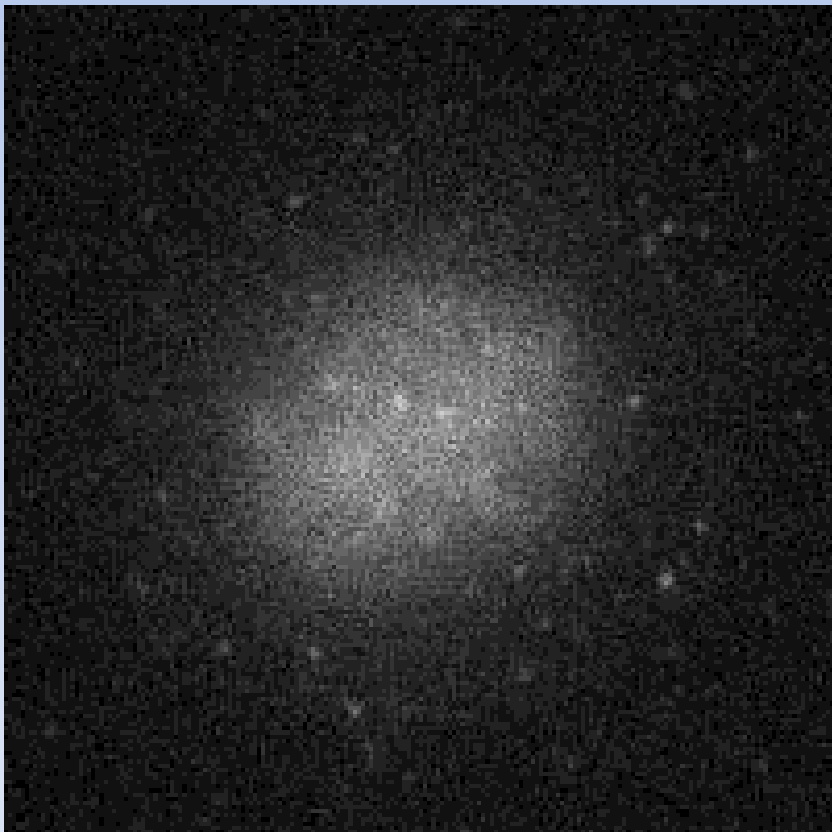


# Artificial intelligence

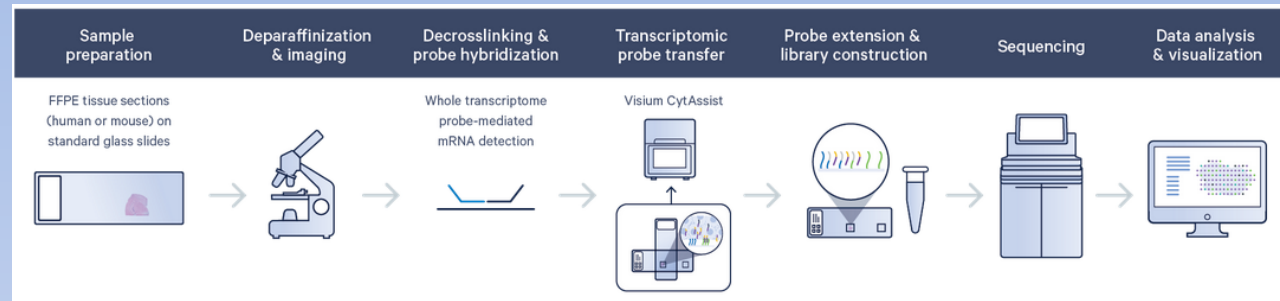
## Machine learning and Deep learning

- Pre-trained algorithms
- Custom-trained algorithms

Nikon Ai Denoise

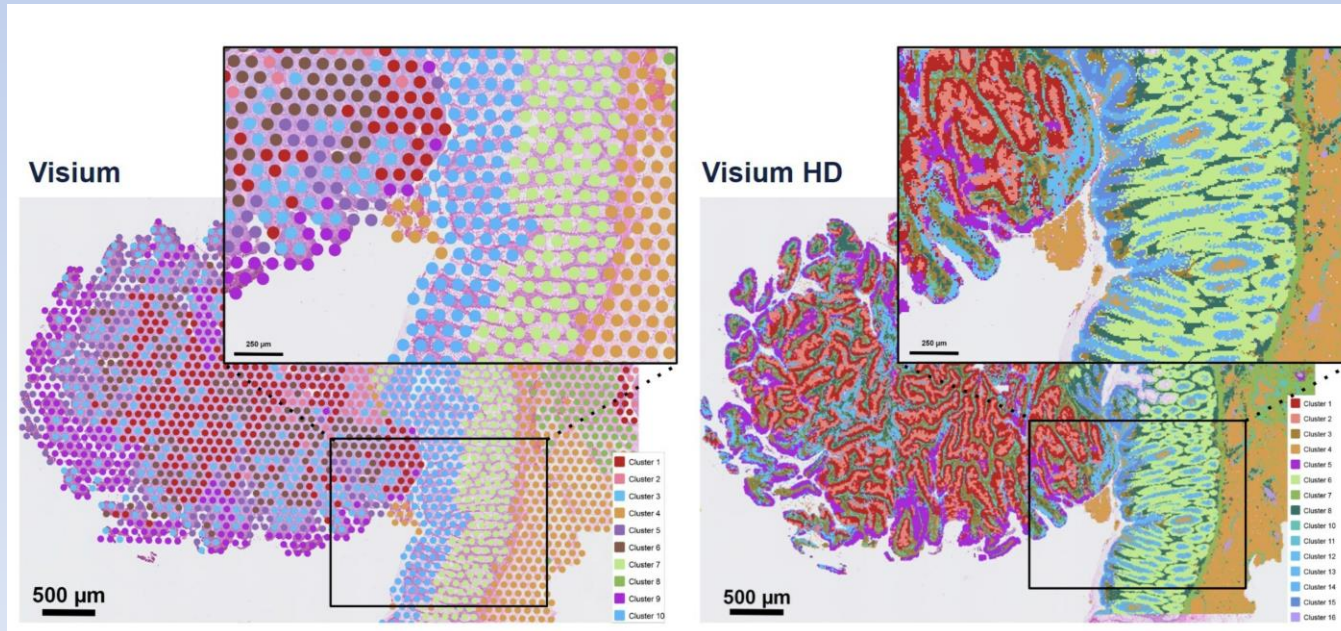


# Spatial transcriptomics: LCI, SICOF, BEA, FENO



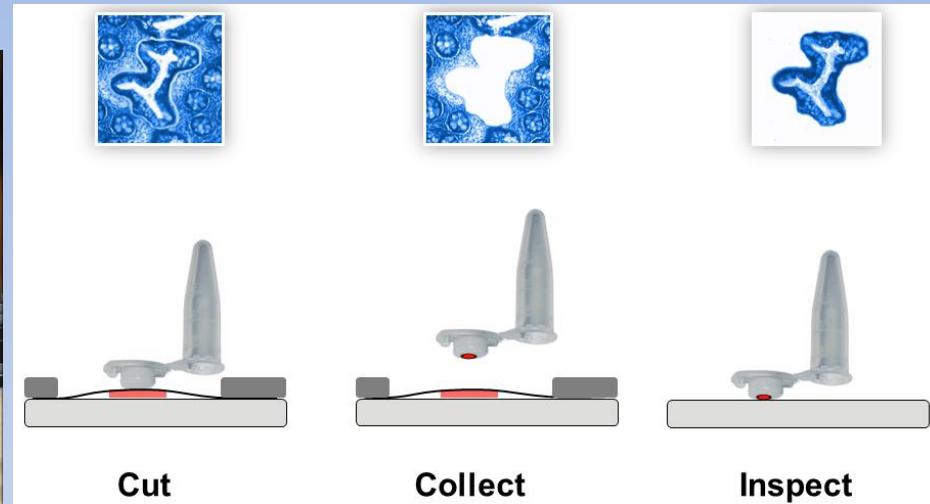
## Cytassist and Visium

- Whole transcriptome
- Human/mouse
- 13\*13 mm tissue regions
- Subcellular spatial resolution
- Compatible with H&E and IF

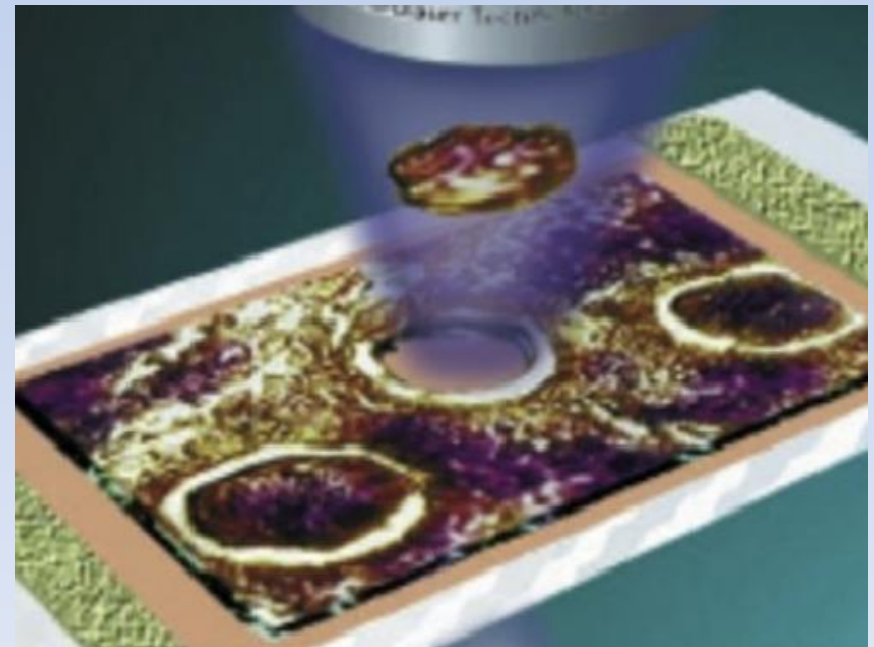
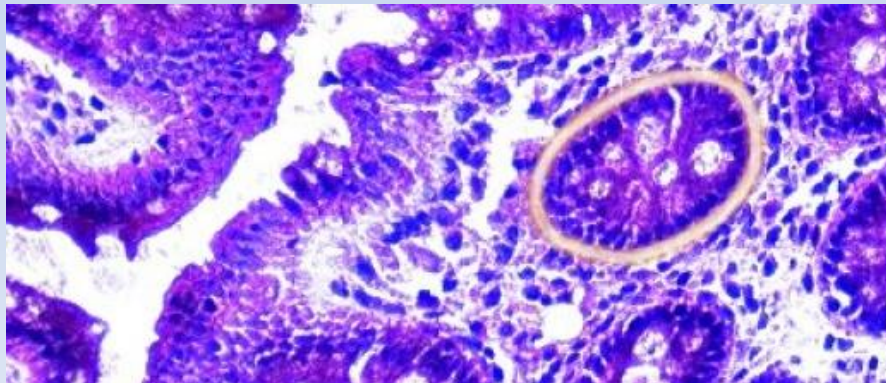


<https://www.10xgenomics.com/instruments/visium-cytassist>

# Spatial transcriptomics: Laser microdissection



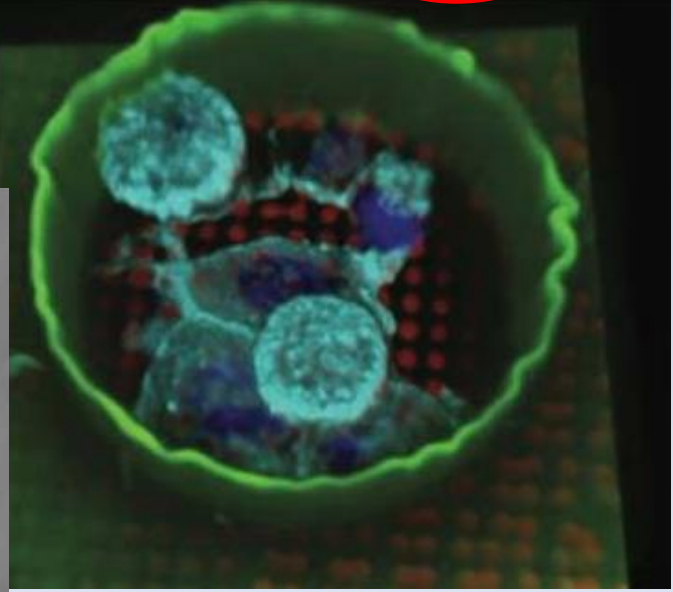
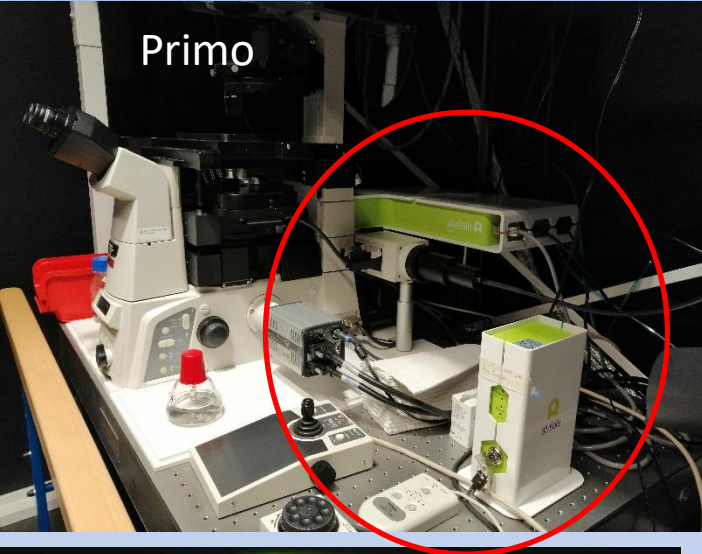
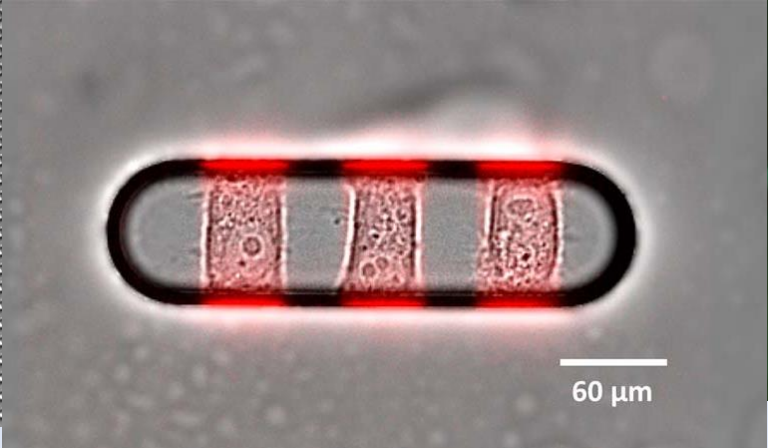
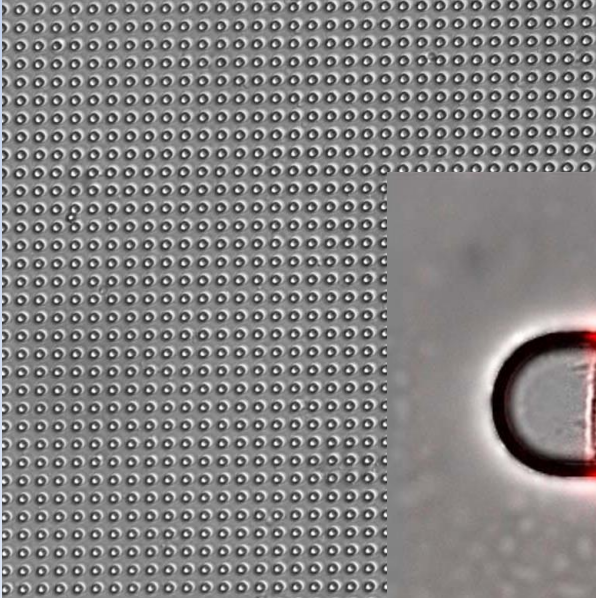
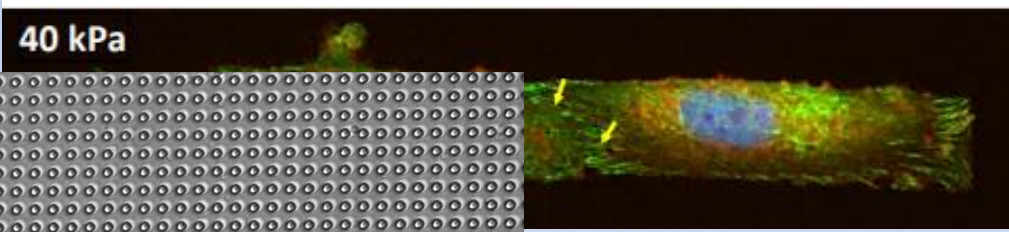
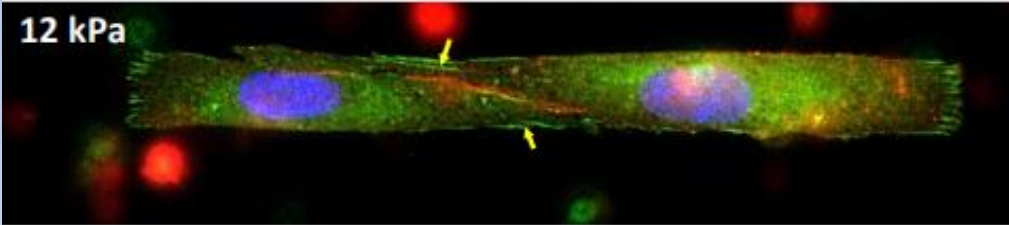
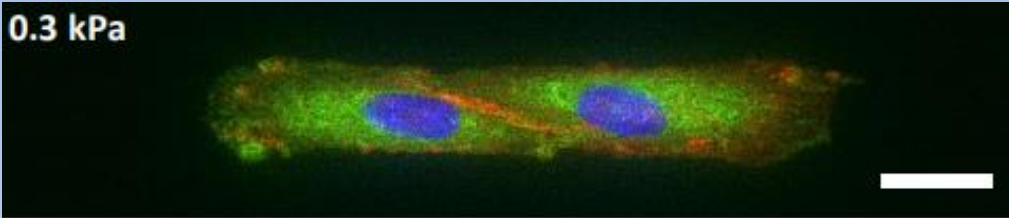
RNAse-free collection



MMI website

The Live Cell Imaging core facility

# Micropatterning and micromanufacturing with Primo



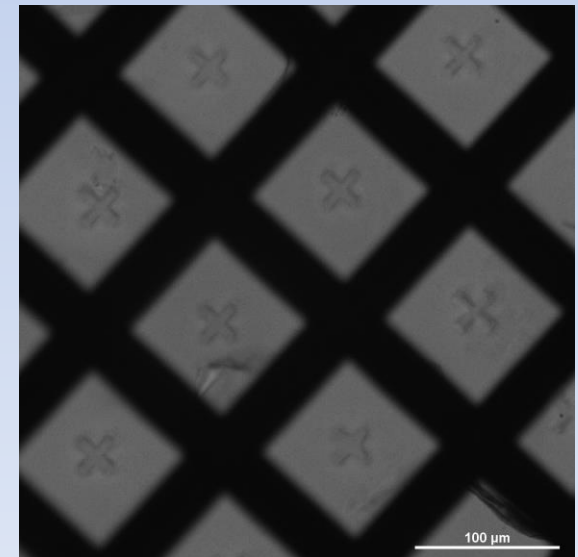
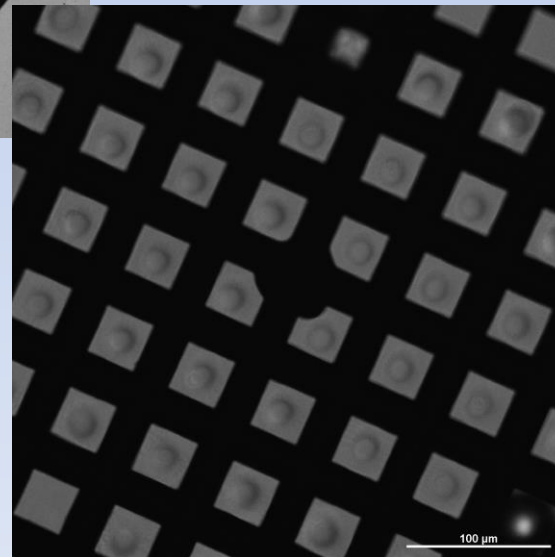
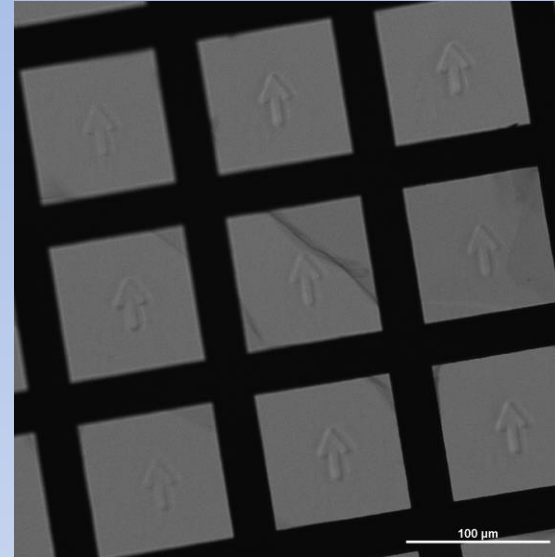
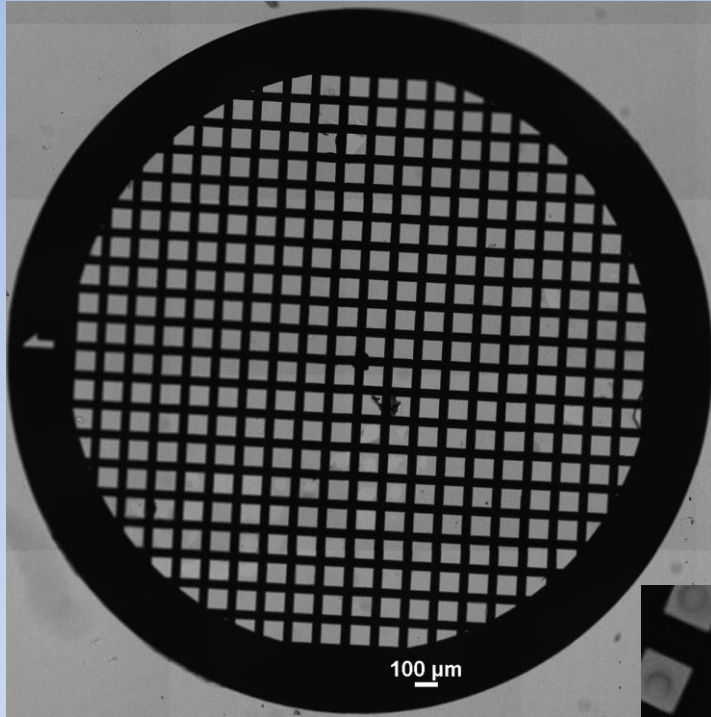
Alveole website



The Live Cell Imaging core facility

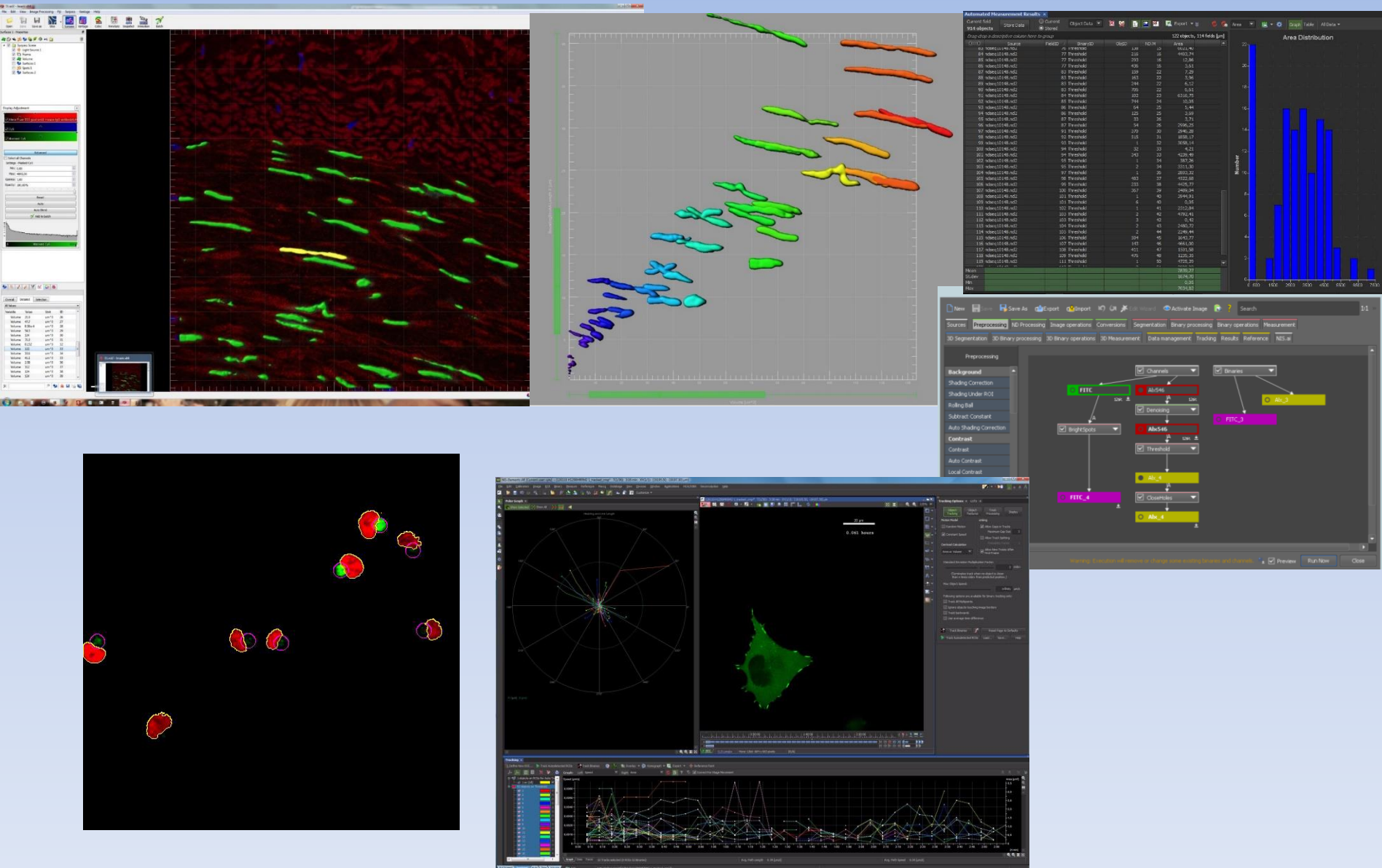


# Micropatterning and micromanufacturing with Primo



Any pattern shape or size

# Image analysis: Remote desktop servers



Nikenza Viceconte, Hamdah Abassi

The Live Cell Imaging core facility



# LCI website

**The Live Cell Imaging Core Facility**

Does your project require light microscopy? Contact us at the LCI core facility to find out how we can help you. We have fantastic equipment to image any type of samples, large or small, live or fixed. We also have all the expertise required to help you design your experiment and guide you through sample preparation, image acquisition and image analysis.

[Contact us to discuss a project](#) [Book our services](#)

**Menu for this area**

- [Our offer](#)
- [User guidelines](#)
- [About us](#)

**Equipment at LCI**

- [Microscopes](#)
- [Objectives](#)
- [Image analysis](#)
- [Data storage](#)
- [Data Management](#)

**Using the LCI Core Facility**

- [Services](#)
- [Which microscope does my experiment require](#)
- [Fees](#)

**LCI channels and upcoming events**

- [Upcoming events at LCI](#)
- [LCI webinars/lectures](#)
- [LCI Blog](#)
- [LCI YouTube channel](#)
- [LCI WhatsApp channel](#)

**The LCI microscopy course**

Learn all the fundamentals of microscopy by attending our annual microscopy course or get trained at our facility.

**LCI teaching material and videos**

**Useful documents for microscopy**

**LCI gallery and Testimonies from our users**

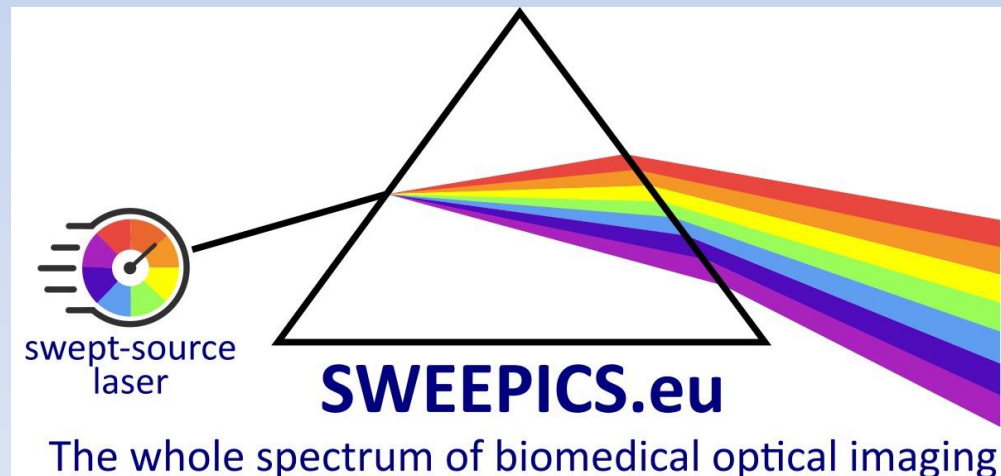
**Publications**

# Research

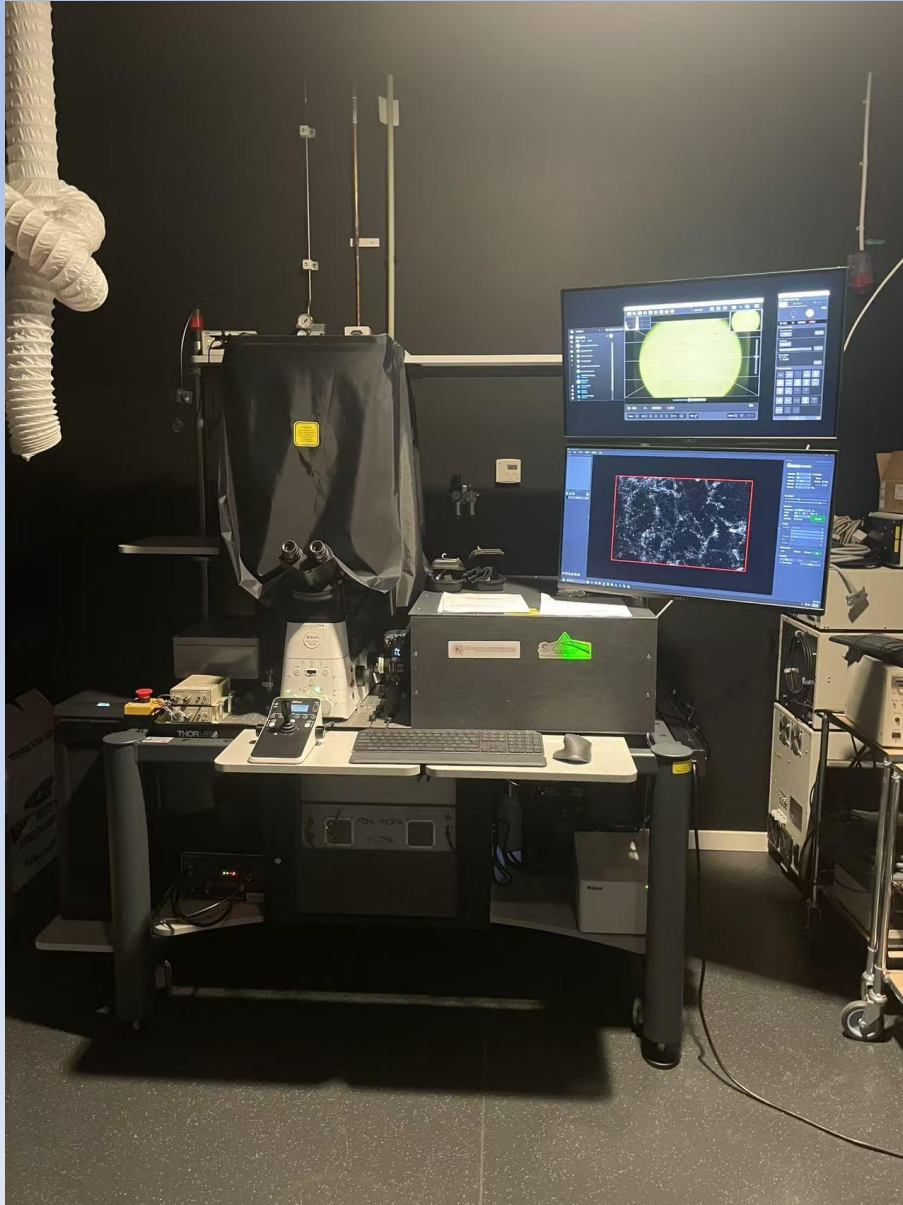
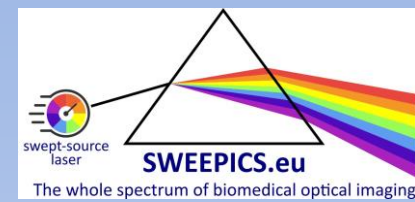
# Benchmarking of SWEEPICS

## SWEPT LASERS FOR NON-INVASIVE DIAGNOSTICS

Jianjiang Hu, Staffan Strömblad, Sylvie Le Guyader



# LCI news: SWEEPICS



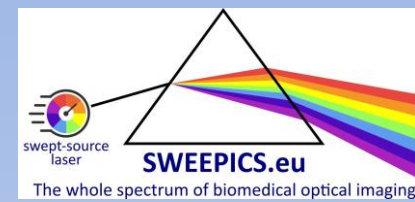
Installed March 17th 😊

Benchmarking:

- Speed
- Depth

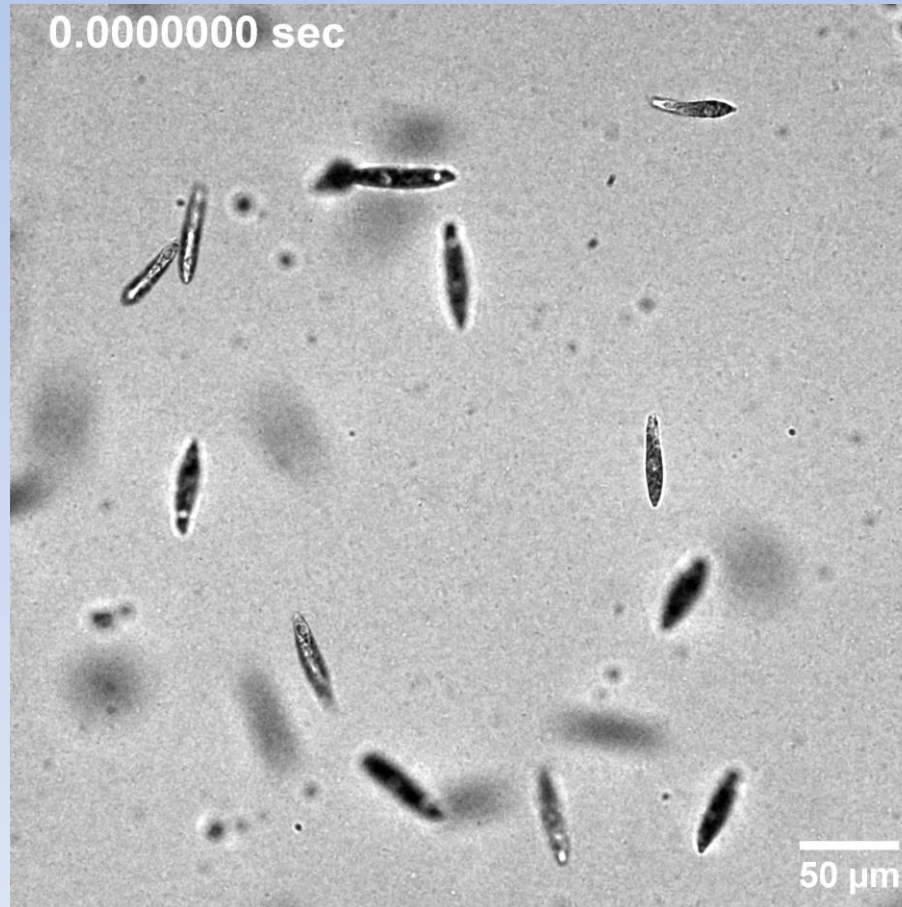
Jianjiang Hu, LCI facility

# Benchmark Imaging **Speed**



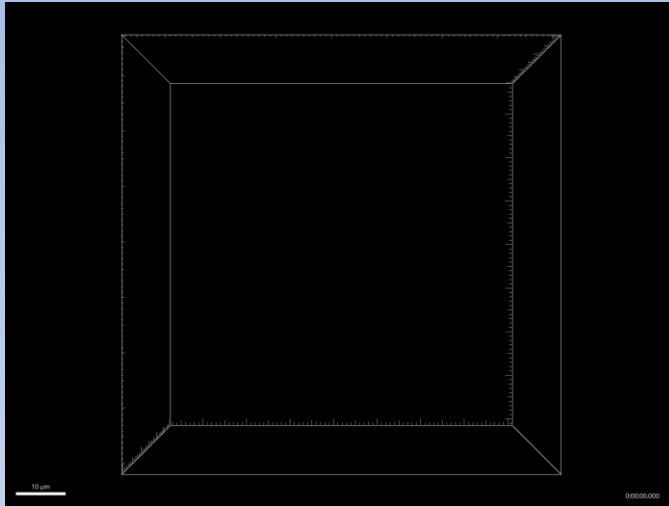
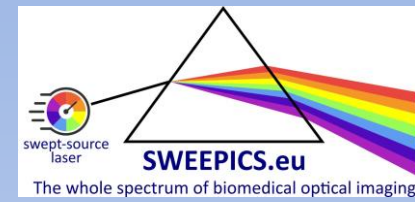
**Model:** *Euglena Gracilis*

Single cell flagellated microorganism

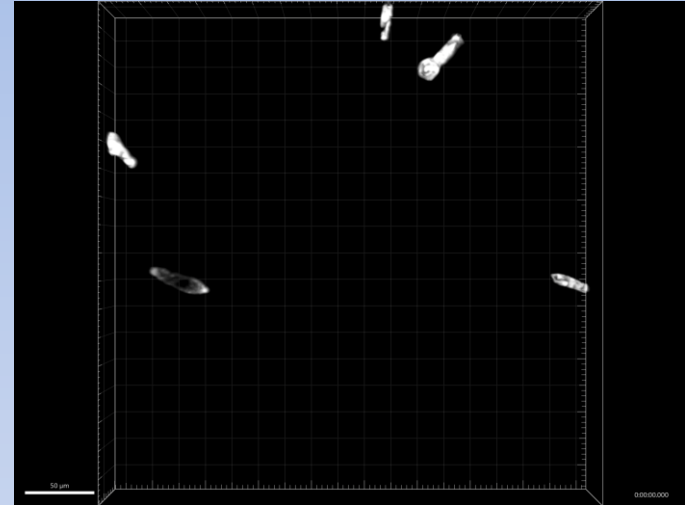


The Live Cell Imaging core facility

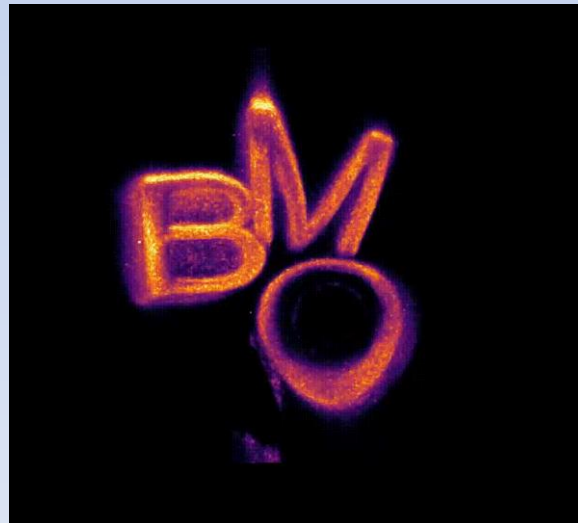
# Benchmark Imaging Speed



Single point confocal, Resonant scanner



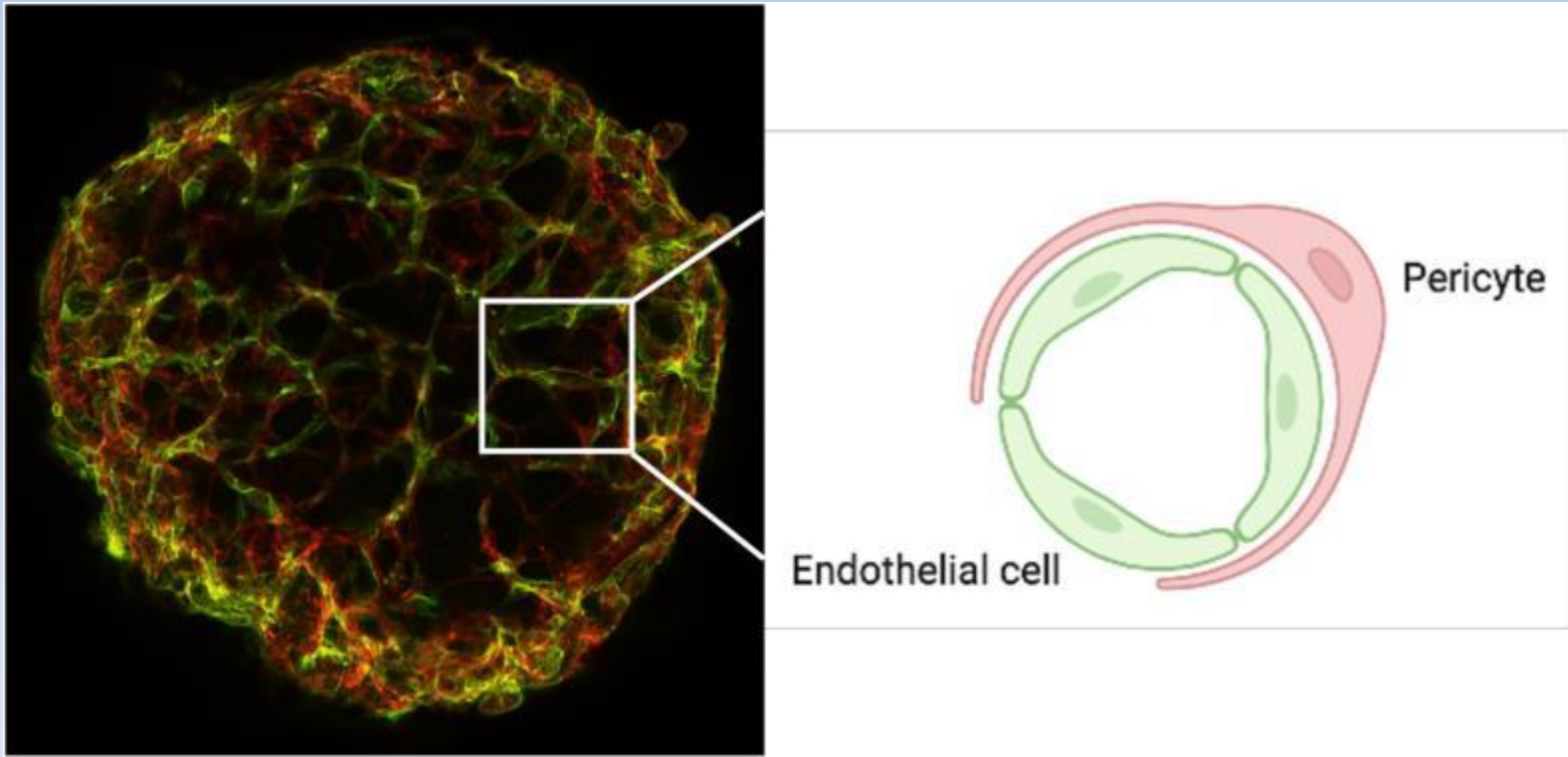
Spinning disk confocal



SWEEPICS

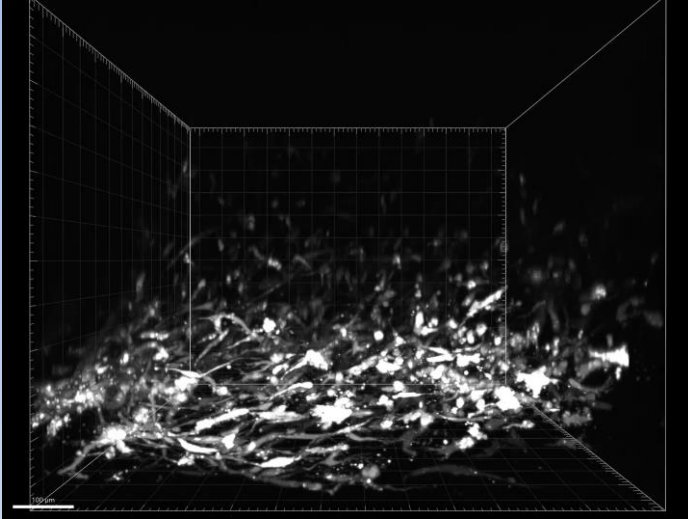
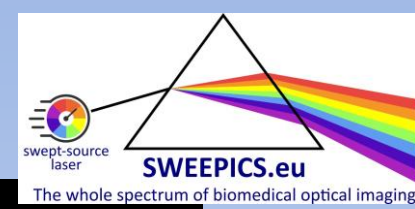
# Benchmark Imaging Depth

**Model:** *Blood vessel organoid (1 mm)*



# Benchmark Imaging Depth

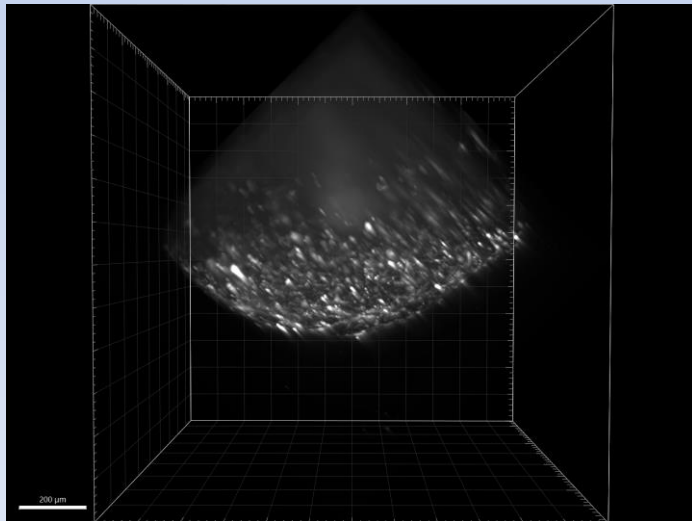
## Non-cleared organoids



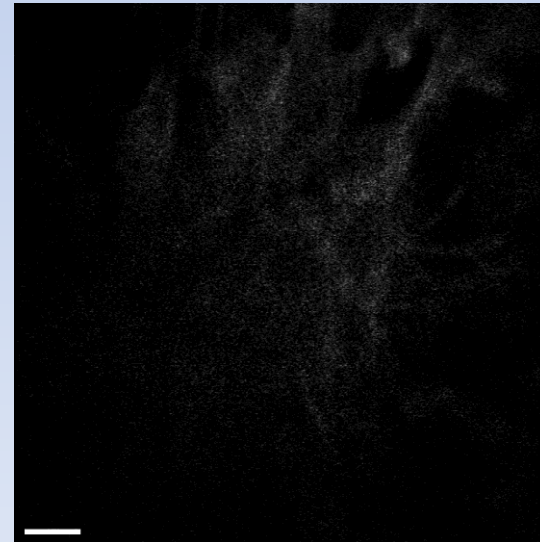
Single point confocal



Spinning disk confocal

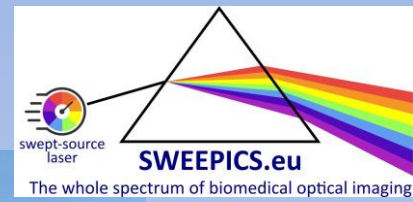


Light sheet



SWEEPICS

# The SWEEPICS team in Lübeck ☺



The Live Cell Imaging core facility

# Education

# Education at the LCI: yearly microscopy course (6 ECT)

The LCI course is a tour de force! 😊

- Remote: 20 students in their own lab.
- Their own 20 microscopes: how their microscopes work.
- Their own 20 samples: how to improve their sample.
- Their own 20 ways to acquire images: how to ensure reliability and reproducibility.



# Education at the LCI: yearly microscopy course

Testimonies from our students

‘The **course was exceptional**. Most importantly, **the instruction was highly tailored to my individual project**, offering specific, actionable insights that **significantly advanced my research**.’

‘I am genuinely surprised by **how valuable this course has been**. Today **I feel much more secure and capable**. Thank you very, very, very much!!!!’

“I was amazed how well it was put together.”



# Education at the LCI: Train-the-Trainer course

For teaching staff at other core facilities

How to use pedagogy to improve the training routines at other core facilities.

- Workshops
- Train-the-Trainer course: Magnify your impact!

Rhonda Reigers Powell,  
Clemson University, USA



The poster features a dark blue header with the title 'Train the Microscopy Trainer' in white. Below the title is a green horizontal line and the date '11th September 2025'. The main content area is white and contains an illustration of a woman with glasses writing at a desk with a microscope. Above her are icons for a presentation slide, a laptop with 'SCIENCE' on the screen, a microscope, a lightbulb, and a clipboard. To the right of the illustration is a vertical line, followed by text describing the course and a list of objectives. At the bottom right, there is a blue button that says 'APPLY BY 20 SEPTEMBER 2025'.

## Train the Microscopy Trainer

11th September 2025

Do you train others to use light microscopy and would like to improve your training?

*Dr. Sylvie Le Guyader and Ms. Rhonda Powell* invite you to apply to the online course: **"Magnify Your Impact: Train the Microscopy Trainer."**

This practical, interactive, online course is intended for anyone with experience training people to use light microscopes, including Core Facility Staff and Industry Applications Specialists.

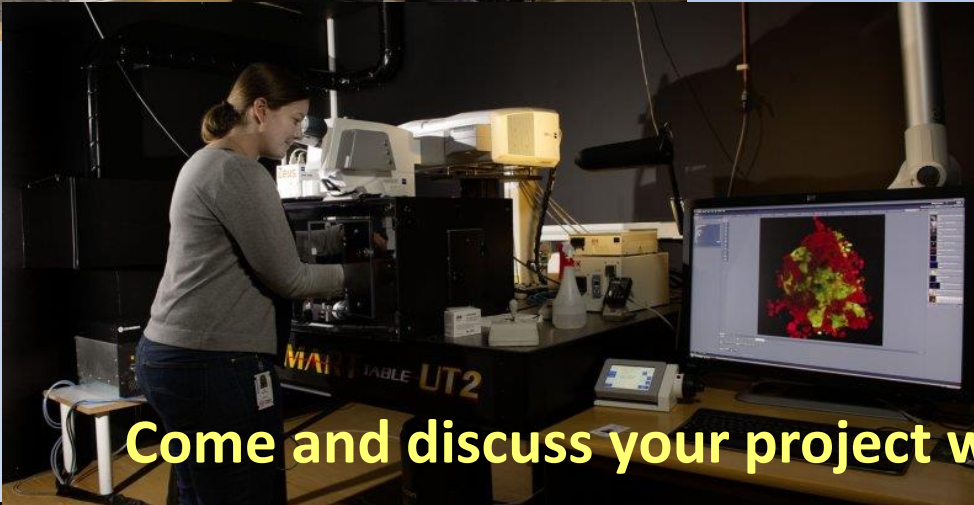
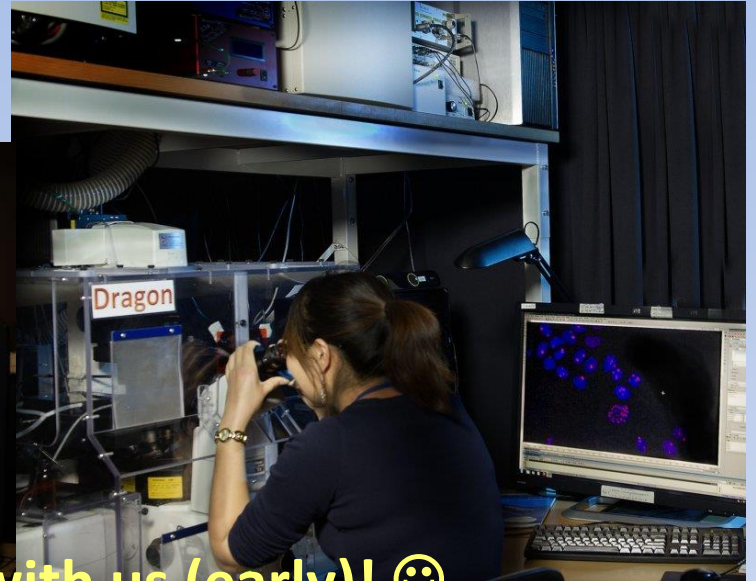
During the course, you will focus on improving your OWN training. By the end of the course, you will be able to:

- Write a list of learning objectives for your own microscopy training
- Incorporate new pedagogical tools in your microscopy training
- Evaluate the quality of your training using assessments and feedback

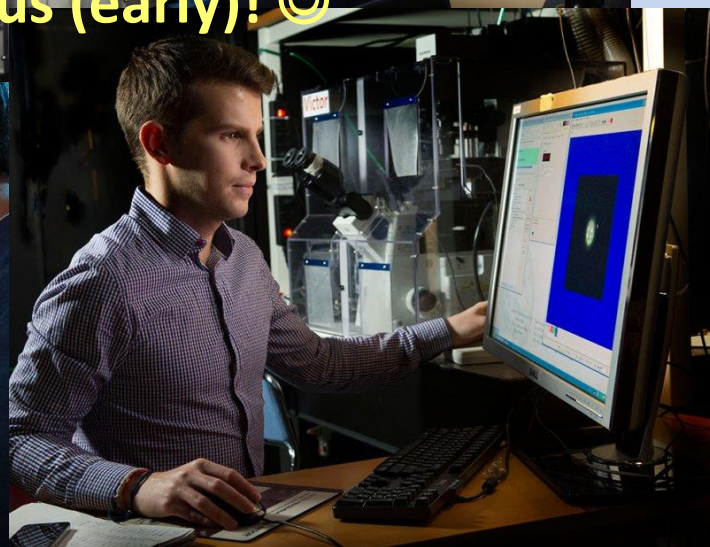
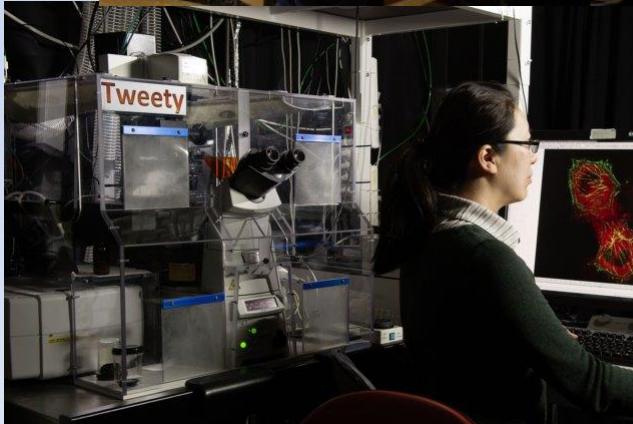
**APPLY BY 20 SEPTEMBER 2025**

# Conclusion

# The LCI core facility



Come and discuss your project with us (early)! 😊



Staffan Larsson

# The LCI core facility staff 😊



Gabriela Imreh



Sylvie Le Guyader



Jianjiang Hu