

# Okinawa Microscopy Workshop 2024

*Bringing together the microscopy communities from  
Japan and Southeast Asia*

2-7 April 2024





# Okinawa Microscopy Workshop 2024

*Bringing together the microscopy communities from  
Japan and Southeast Asia*

2-7 April 2024

Activities :



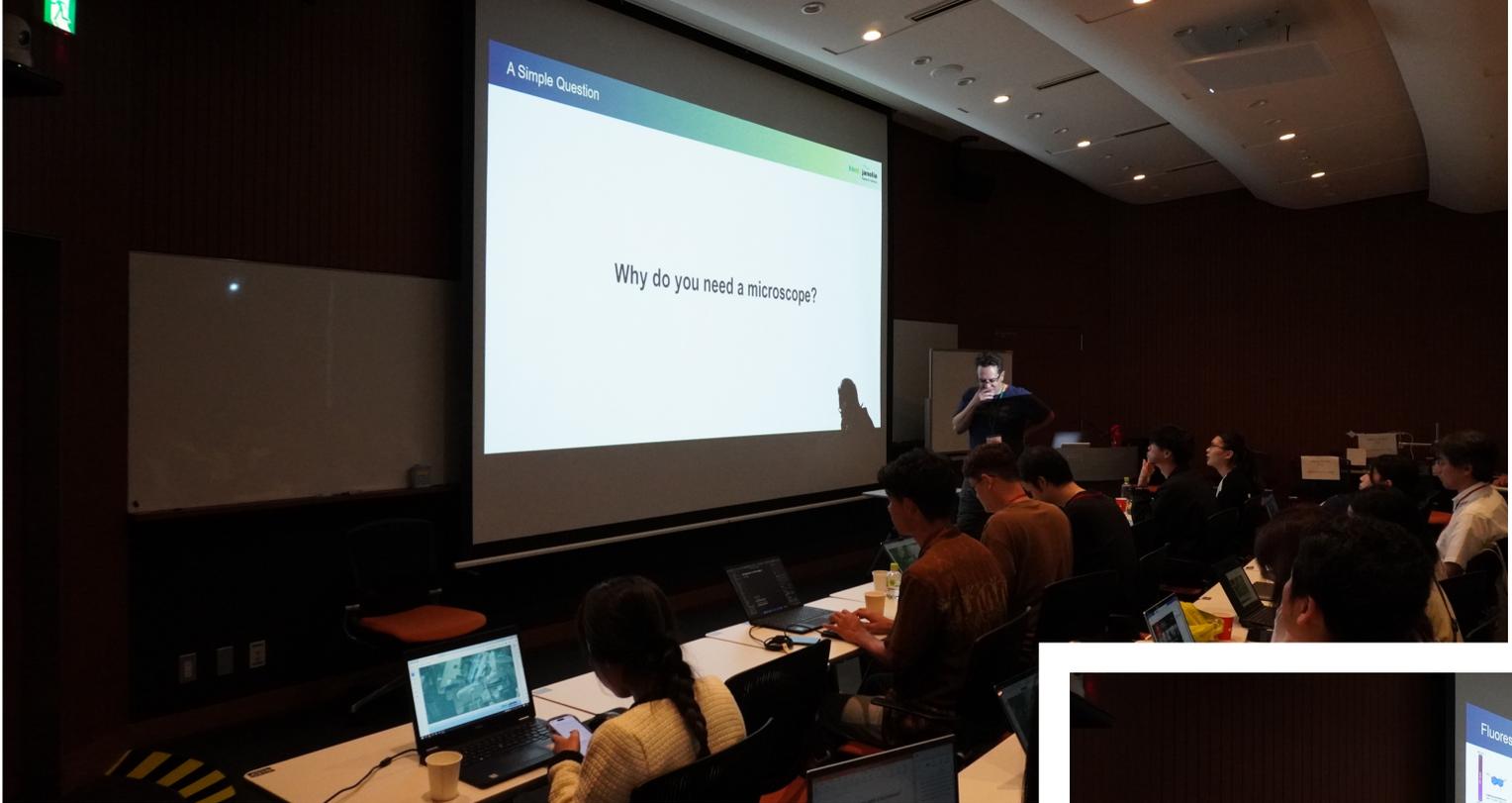
- 48 participants and lecturers
- 13 different countries
- 6 full days + Welcome reception on day 0
- 3 keynote seminars >100 audiences
- 10 sponsors



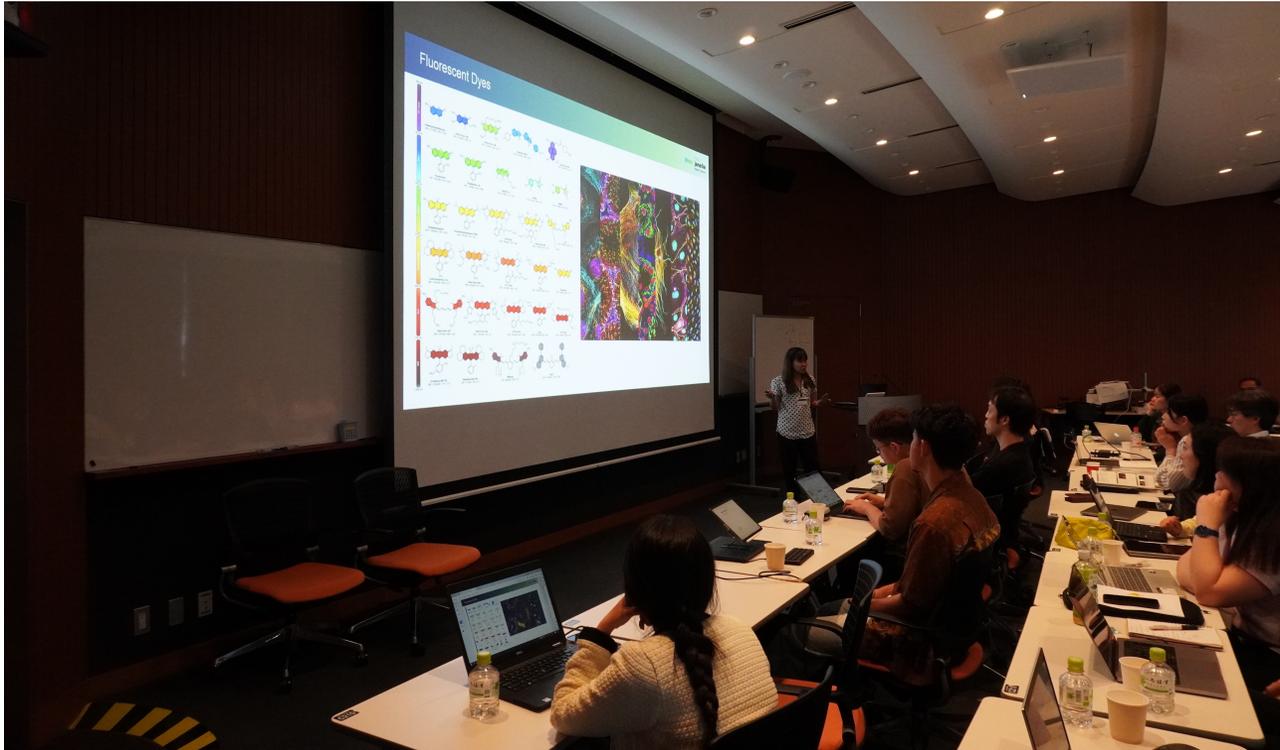
Welcome reception



Workshop T-shirts



Lectures covers from basic to advanced optics and microscopy.



## 3 Keynote lectures:



### SEMINAR



**Dr. Atsushi Miyawaki**  
RIKEN Center for Brain Science



*Date:* 2 April 2024  
*Time:* 3:30 PM  
*Seminar room:* OIST Center Building C210

#### Cruising inside cell

The behavior of biochemical molecules moving around in cells makes me think of a school of whales wandering in the ocean, captured by the Argus system on the artificial satellite. When bringing a whale back into the sea --- with a transmitter on its dorsal fin, every staff member hopes that it will return safely to a school of its species. A transmitter is now minute in size, but it was not this way before. There used to be some concern that a whale fitted with a transmitter could be given the cold shoulder and thus ostracized by other whales for "wearing something annoying." How is whale's wandering related to the tide or a shoal of small fish? What kind of interaction is there among different species of whales? We human beings have attempted to fully understand this fellow creature in the sea both during and since the age of whale fishing. In a live cell imaging experiment, a luminescent probe replaces a transmitter. We label a luminescent probe on a specific region of a biological molecule and bring it back into a cell. We can then visualize how the biological molecule behaves in response to external stimulation. Since luminescence is a physical phenomenon, we can extract various kinds of information by making full use of its characteristics. Cruising inside cells in a supermicro corps, gliding down in a microtubule like a roller coaster, pushing our ways through a jungle of chromatin while hoisting a flag of nuclear localization signal --- we are reminded to retain a playful and adventurous perspective at all times. What matters is mobilizing all capabilities of science and giving full play to our imagination. We believe that such serendipitous findings can arise out of such a sportive mind, a frame of mind that prevails when enjoying whale-watching.

Hosted by:



**Shinya Komoto**  
*Imaging Core Facility*  
OIST



**Prof. Naoto Ueno**  
Advanced Bioimaging  
Support (ABiS)



### SEMINAR



**Dr. Hari Shroff**  
HHMI Janelia Research Campus



*Date:* 3 April 2024  
*Time:* 2:45 PM  
*Seminar room:* OIST Center Building C210

#### Multiscale biological imaging at high spatiotemporal resolution

I will survey key technologies developed in my lab, with an emphasis on microscopes well-suited for studying 4D cellular physiology. Advances in light-sheet and structured illumination microscopy will be presented, including a recent multi-view confocal system that enables super-resolution imaging in tissue. I will also discuss deep learning methods for further enhancing contrast, resolution, and experiment duration. Finally, I will discuss application of these methods to mapping nuclear positions in post-twitching embryonic *C. elegans* and combining this positional information with gene expression derived from single cell RNA seq experiments.

Hosted by:



**Shinya Komoto**  
*Imaging Core Facility*  
OIST



**Prof. Naoto Ueno**  
Advanced Bioimaging  
Support (ABiS)



### SEMINAR



**Dr. Teng-Leong Chew**  
HHMI Janelia Research Campus



*Date:* 5 April 2024  
*Time:* 1:30 PM  
*Seminar room:* OIST Center Building C210

#### Imaging Across Biological Length Scales with the Emerging Frontiers in Microscopy

Biography

Former director of the Center for Advanced Microscopy at Feinberg School of Medicine, Northwestern University in 2002, and led the facility to be recognized as one of the few selected Nikon Imaging Centers of Excellence in the world. At the same time, his lab began devising methods to engineer three-dimensional, lumenized vascular network capable of dynamic signaling read-out. This approach ultimately allowed Chew and his team to dissect the regulatory signals in the opposing endothelial cells during active tumor diapedesis – providing a rare glimpse into the signaling cascade during tumor invasion, not from the perspective of the cancer cell, but from the underlying endothelium.

In 2009, Chew was further appointed to the position of Director for University Imaging Resources at Northwestern, overseeing the overarching strategy in building integrated imaging infrastructure across all seven imaging centers and cores within the university.

Chew joined Janelia in 2014 to serve as the Director for the Advanced Imaging Center. Here, he leads the effort in building the unique collaborative imaging center that serves as the gateway through which the wider scientific world can access Janelia's cutting-edge microscopy capabilities.

Hosted by:



**Shinya Komoto**  
*Imaging Core Facility*  
OIST

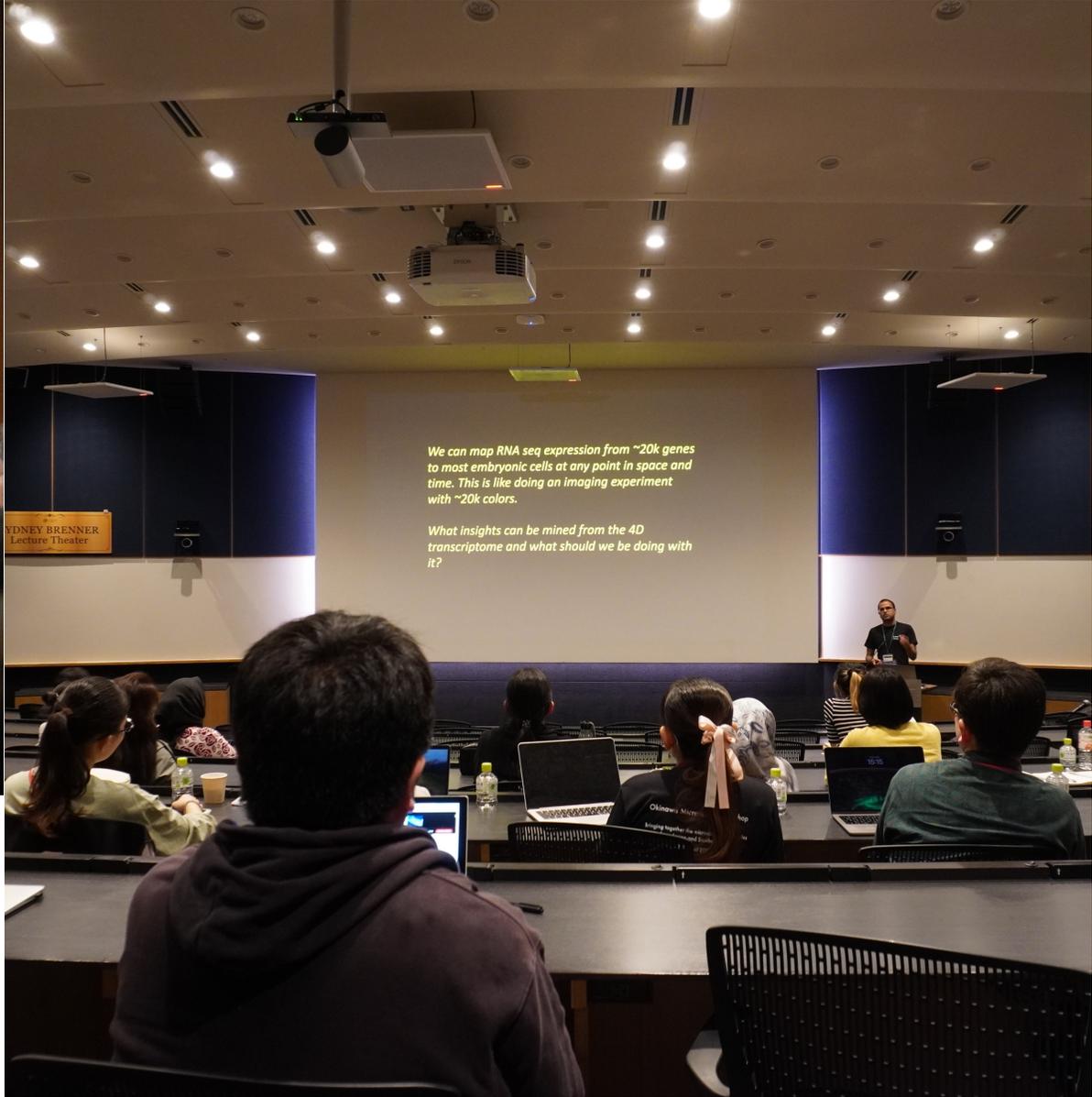


**Prof. Naoto Ueno**  
Advanced Bioimaging  
Support (ABiS)

Atsushi Miyawaki @ RIKEN CBS



Hari Shroff @ HHMI Janelia Research Campus







Group Project: Practical session



Hands on session



# Okinawa Microscopy Workshop 2024

A joint microscopy opportunity for Southeast Asia and Japan

## Summary

Optical microscopy is a powerful tool for life sciences. Due to its versatility, microscopy can span a large spectrum of biological length scales, from single molecules to whole organisms. More importantly, it is uniquely designed to offer quantitative mechanistic insights into the spatiotemporal relationships of cells, organisms, macromolecules, and sub-cellular structures and processes.

Organized and hosted by the Imaging Core Facility of Okinawa Institute of Science and Technology, OIST, the Okinawa Microscopy Workshop (OMW) will be conducted by the Advanced Imaging Center (AIC) team of the Howard Hughes Medical Institute Janelia Research Campus. This team has strong track record in pioneering quantitative microscopy workshops globally, including in resource-limited regions of the world such as Imaging Africa (2020, 2022), Imaging Latin America (2022), and soon Imaging Caribbean (2024).

Driven by the global leadership of the Japanese imaging community, the OMW also aims to offer the training opportunity to scientists from non-profit organizations in Southeast Asia in addition to Japanese attendees. To facilitate the participation of Southeast Asian scientists, OMW covers all expenses for all workshop attendees – including meals, transport, and accommodation. The workshop provides its attendees the opportunity to learn the skills and techniques necessary to fully harness the power of optical microscopy.



**Date/Venue:** 2024 April 02-07, 6 days program @ OIST Imaging Core Facility, Okinawa, Japan

## Curriculum highlights

The OMW emphasizes three central tenets: (i) hypothesis-driven quantitative experimental design, (ii) technical understanding of optical microscopy, and (iii) digital image processing analysis. These concepts will be fully integrated into a week-long, hands-on curriculum that includes:

- Principles of microscopy, such as the fundamentals of optics, digital detectors, wide-field microscopy, laser scanning confocal, deconvolution, spinning disk confocal, and TIRF.
- Molecular imaging tools, including the design and application of biosensors, optogenetics.
- Specialized imaging approaches and techniques, such as FRAP, FRET, photoconversion, light sheet, and super-resolution microscopy.
- Sample preparation and maintenance of specimens for live imaging.
- Digital image processing and quantitative image data analysis that include image filters, denoising, feature enhancements, Fourier transformation, machine learning, colocalization analysis, ratiometric imaging, object tracking, and mathematical modeling of biological movement.
- Developing skills in recognizing scientific bias, scientific communication, proposal writing, and reporting of microscopy data.

**Keynote address and seminars:** The workshop also aims to include two keynote addresses (open to workshop attendees and all OIST scientists), and also seminars on the emerging horizons of optical microscopy given by the AIC director. This is an opportunity to showcase what is possible when advanced microscopy is leveraged to address important biological questions.

**Networking:** The workshop is more than a training program. It strives to also develop a platform for interaction and sharing research interests, experience as well as the common aspiration to foster the growth of a collaborative Japanese-Southeast Asian imaging community.

Contact: Shinya Komoto, OIST Imaging Core Facility [shinya.komoto@oist.jp](mailto:shinya.komoto@oist.jp) or [OMW2024@oist.jp](mailto:OMW2024@oist.jp)



## Keynote speakers



**Atsushi Miyawaki**

*RIKEN Center for Brain Science*



**Hari Shroff**

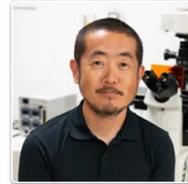
*HHMI Janelia Research Campus*

## Teaching Team



**Teng-Leong Chew**

*HHMI Janelia Research Campus*



**Shinya Komoto**

*OIST*



**Michelle Itano**

*UNC Chapel Hill*



**Jesse Aaron**

*HHMI Janelia Research Campus*



**Michael DeSantis**

*HHMI Janelia Research Campus*



**Satya Khuon**

*HHMI Janelia Research Campus*



**Mai Rahmoon**

*HHMI Janelia Research Campus*



**Harikrushnan Balasubramanian**

*HHMI Janelia Research Campus*



**Owen Puls**

*HHMI Janelia Research Campus*

Supported by

