

THE GIS
SPEAKER SERIES



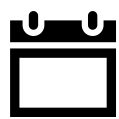
A novel approach for single-cell 3D spatial omics

Dr. Katsuyuki Shiroguchi

Team Director

RIKEN Center for Biosystems Dynamics Research (BDR)

Host: Chen Kok Hao



Thursday 13 November 2025
3.00pm – 4.00pm



GIS L2 – Seminar Room
60 Biopolis Street, Genome, Singapore 138672

About The Speaker

Dr. Katsuyuki Shiroguchi is a Team Director in RIKEN BDR, Japan. He started his research career in biophysics studying the mechanism of molecular motors by observing single molecule dynamics under a microscope. Later, he shifted to genomics research and developed digital RNA sequencing using originally developed DNA molecular barcodes. His current focus is on single cell analysis to better understand multicellular systems by combining imaging, sequencing, machine learning, and robotics. His targets include stem cells, organoids, immune system, and cancer.

About The Seminar

Multicellular organisms are maintained by the interactions of diverse cells that are appropriately arranged in three-dimensional (3D) tissues. To elucidate this cellular arrangement and interaction, integrated analysis of the 3D positions and comprehensive gene expression profiles of each cell is essential. In recent years, spatial transcriptomics, which simultaneously acquires spatial information and gene expression information, has become widely used. However, while there are methods that can analyze a wide field of view at once using tissue section, it is still difficult to measure the gene expression of adjacent cells in three-dimensional space with high gene coverage even for smaller scales. Here, we developed a novel method of cell isolation retaining 3D cell position information to enable single-cell 3D spatial omics. We applied this method to organoids and small intestinal crypts. By integrating single cell RNA-seq and spatial information, we identified spatially-biased expressed genes and analyzed interactions between adjacent cells based on their 3D positions. This approach is compatible with other omics measurements (not limited to RNA-seq), and can be applied to various multicellular samples to elucidate cell-cell interactions.