NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

ON-SITE BIOLOGY COLLOQUIUM

Friday, 13 Sept 2024 | 4 pm | DBS Conference Room 1, Blk S3 Level 5

Hosted by Assist. Prof Tan Yong Zi

Map to Block S3

Optimizing the performance and throughput of cryo-EM single particle analysis and tomography

By **Radostin Danev**

The University of Tokyo

Cryo-electron microscopy (cryo-EM) has made and continues to make significant progress in recent years. Single particle analysis (SPA) remains the main application of cryo-EM and has become a powerful mainstream method for 3D structure determination of isolated proteins, complexes, and viruses. Cryo-electron tomography (cryo-ET) is more challenging, and its development and applications have lagged behind those of SPA. Nevertheless, cryo-ET offers an unprecedented nanometre-level view inside the cell and provides means of observing proteins, their organization, and interactions in their native environment. In recent years, there have been significant efforts to optimize the performance and increase the throughput of both techniques, including the development of new hardware and software tools, as well as improvements in data acquisition strategies. Here, we present our current work on enhancing the capabilities, ease-of-use, and automation of cryo-ET and SPA, and discuss future directions. By continually improving the performance and throughput of cryo-EM, it is possible to further expand the range of biological systems that can be studied and ultimately improve our understanding of the fundamental processes of life.

About the Speaker

Rado Danev graduated solid-state physics at the University of Sofia in Bulgaria. During his Ph.D. in the laboratory of Prof. Nagayama in Okazaki, Japan, he worked on the development of phase plates for electron microscopy. In 2011 he became a group leader at the Max Planck Institute of Biochemistry in Martinsried, Germany, and led an academia-industry collaboration that resulted in the development of the Volta phase plate (VPP). Since 2018, Rado has been a professor at the Graduate School of Medicine, The University of Tokyo. His current projects involve cryo-EM studies of GPCRs in collaboration with the GPCR team at Monash University, first forays into cryo-tomography, and more generally, methods development for cryo-EM.