Title: Meta-imaging: From Microscopy to Astronomy

Abstract: Light is the main carrier of information in nature and vision is an essential tool for human beings to perceive the world. As an extension of human vision, optical imaging can extend our observational range to scales and precision beyond the reach of the human eye. Advanced imaging techniques will push forward the boundaries of human perception and cognition in various scales, from organelle interaction at the nanoscale to the evolution of galaxies many light years away. in this talk, Prof. Dai will discuss their recent works in meta-imaging. a new imaging paradigm to explore the structures and dynamics from microscopy to astronomy. They achieved fast, high-resolution, and ultrasensitive3D observation of various large-scale subcellular processes, including brain-wide neural activity in mice at single-cell resolution, cell migrations during immune responses and tumor metastasis, membrane dynamics in zebrafish embryos, etc. In the future meta-imaging has the potential to be a general imaging architecture for a wide range of applications in biology, medicine, and astronomy.

Biography: Qionghai Dai is a full Professor at Tsinghua University, the Academician of Chinese Academy of Engineering. Dean of the School of information Science and Technology. and the director of the Institute of Brain and Cognitive Sciences at Tsinghua University. He is also the chairman of Chinese Association for Artificial Intelligence.

Qionghai' s research centers on the interdisciplinary study of optics, informatics, neuroscience, and cognitive sciences, with hundreds of journal papers published in Nature, Cell, Nature Methods, Nature Biotechnology, etc. In the past decades, he has invented a series of mesoscale imaging systems and data analysis methods, facilitating simultaneous multi-scale observation of biological dynamics spanning from organelles, cells, tissue, and organs in different pathological or physiological states at a system level. His efforts open up a new horizon for the study of large-scale intercellular interactions, paving up the way from brain sciences to artificial intelligences. Recently, he is working on system neuroscience, artificial intelligence, computational imaging, large-scale data analysis methods, and neuromorphic optoelectronic devices.