

HKIAS 10th Anniversary Distinguished Lecture Series

Brain Science and Brain-inspired AI

14 October 2025 (Tuesday)

3:30pm-4:30pm

(Light refreshment will be served from 3:00pm-3:30pm)

Senate Room, 19/F, Lau Ming Wai Academic Building,
City University of Hong Kong



Speaker:

Professor Muming Poo

HKIAS Senior Fellow

Scientific Director, Institute of Neuroscience of
Chinese Academy of Science

Director, Shanghai Center for Brain Science and
Brain-Inspired Technology

Abstract Rapid progress has been made in recent decades in understanding the structure and function of the brain. We have gained many insights and concepts on the workings of the brain, including the diversity of cell types, their spatial distribution and connectivity within the brain, formation and plasticity of neural connections, cellular and molecular basis of learning and memory, mechanism for converting short-term into long-term memory, perceptual binding of multi-modal information, and circuit mechanisms for higher cognitive functions such as attention, decision-making, social behaviors, and consciousness. Although much remain to be learned, some basic principles of the brain could be introduced into the algorithms for machine learning and architectures for artificial neural networks. Five directions for brain-inspired construction of AI networks could be suggested: (1) diversification of neuronal types, (2) selective feedback and lateral connections, (3) use-dependent formation and elimination of neuronal connections, (4) consolidation and erasure of memories, (5) nested structure of neuronal groups or modules within the network. Extensive use of spiking neural networks, taking advantages of sequence information associated with spike timing, will greatly facilitate the deployment of brain network mechanisms. Besides inspiring the design of more energy-efficient computing systems, there is an urgent need for comparative studies of natural and artificial intelligences. With the forthcoming artificial general intelligence (AGI) that rivals or even surpasses human intelligence, it will be useful to develop brain science-based experimental approaches for monitoring the emergence of various aspects of human-like intelligent behaviors in embodied AI systems. These include emotion and feeling, empathy, theory of mind, cooperation and deception, metacognition, self-consciousness, and system-derived goals, so that appropriate regulatory measures could be designed to prevent misaligned behaviors of AI systems. Furthermore, based on our understanding of the development of intelligent and ethical behaviors of children, we need to design “educational” programs for establishing ethics and moral conducts in AI systems that well-aligned with the needs of human society.

Biography Mu-ming Poo is the Scientific Director of Institute of Neuroscience, Chinese Academy of Sciences (CAS), Director of Shanghai Center for Brain Science and Brain-Inspired Technology, and Paul Licht Distinguished Professor in Biology Emeritus at University of California, Berkeley. He studied physics at Tsinghua University in Taiwan and received PhD in biophysics from Johns Hopkins University in 1974. During 1976-2012, He had served on the faculty of UC Irvine, Yale, Columbia, and UCSD, and UC Berkeley. He was the founding director of Institute of Neuroscience, CAS (1999-2019), and a member of Chinese Academy of Science, Academia Sinica, and Hong Kong Academy of Science, an international member of US National Academy of Science and an international member of Russian Academy of Sciences. He was awarded Ameritex Prize, International Science & Technology Cooperation Award of P. R. China, and Gruber Neuroscience Prize. Poo's research interest includes axon growth, synaptic plasticity, and the use non-human primates to study higher cognitive functions and human brain disorders. He is the Executive Editor-in-Chief of *National Science Review* and the editorial board member for many journals, including *Neuron* and *Progress in Neurobiology*.

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 34426611

 hkias@cityu.edu.hk

Registration:

<https://go.cityu.hk/p7krmx>

