



NUS
National University
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iHealthtech
Institute for Health Innovation
& Technology

"Innovating Health" Distinguished Speaker Seminar Series

Professor Tony Hu

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Executive Officer for Medical Engineering**

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Photoacoustic, Light-Speed, and Quantum Imaging

23 SEP 2025, TUE, 3 PM - 4 PM

NUS, College of Design and Engineering, Building E7, Level 3, Seminar Room 4

Hosted by: Professor Lim Chwee Teck, iHealthtech Director

We developed photoacoustic tomography (PAT) for deep-tissue imaging, offering in vivo functional, metabolic, molecular, and histologic imaging from organelles to entire organisms. PAT combines optical and ultrasonic waves, overcoming the optical diffusion limit (~1 mm) with centimeter-scale deep penetration, high ultrasonic resolution, and optical contrast. Applications include early cancer detection and brain imaging.

Additionally, we developed light-speed compressed ultrafast photography (CUP), capable of capturing the fastest phenomena, such as light propagation, in real time. CUP, with a single exposure, captures transient events on femtosecond scales. CUP can be paired with various front optics, from microscopes to telescopes, facilitating diverse applications in fundamental and applied sciences, including biology and cosmophysics.

Further, our research extends to quantum entanglement for imaging. Quantum imaging utilizing Heisenberg scaling enhances spatial resolution linearly with the number of quanta, outperforming the standard quantum scaling's square-root improvement.

Speaker Biography | Lihong Wang edited the first book on photoacoustic tomography. His book entitled "Biomedical Optics: Principles and Imaging," one of the first textbooks in the field, won the 2010 Joseph W. Goodman Book Writing Award. He has published 615 peer-reviewed journal articles and delivered 630 keynote/plenary/invited talks. His Google Scholar h-index and citations have reached 166 and 118,000, #1 most cited in optics according to Stanford/Elsevier. His laboratory was the first to report functional photoacoustic tomography, 3D photoacoustic microscopy, photoacoustic endoscopy, photoacoustic reporter gene imaging, the universal photoacoustic reconstruction algorithm, and CUP (world's fastest camera). He chairs the annual conference on Photons plus Ultrasound, the largest conference at Photonics West. He was the Editor-in-Chief of the Journal of Biomedical Optics. He received the NIH Director's Pioneer, NIH Director's Transformative Research, and NIH/NCI Outstanding Investigator awards. He also received the OSA C.E.K. Mees Medal, IEEE Technical Achievement Award, IEEE Biomedical Engineering Award, SPIE Britton Chance Biomedical Optics Award, IPPA Senior Prize, and OSA Michael S. Feld Biophotonics Award. He is a Fellow of the AAAS, AIMBE, Electromagnetics Academy, IAMBE, IEEE, NAI, OSA, and SPIE as well as a Foreign Fellow of COS. An honorary doctorate was conferred on him by Lund University, Sweden. He was inducted into the National Academy of Engineering.



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