Los Alamos National Laboratory
Director's Unclassified Colloquium

Professor Lihong Wang
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California Institute of Technology

Physics Auditorium
TA3, SM 215
Thursday, September 12, 2024
1:10 – 3:00pm

Photoacoustic, Light-Speed, and Quantum Imaging (U)

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.

Open to All Badge Holders

Institutional Host: Thomas E. Mason, DIR, A100
Technical Hosts: Jeanne Robinson, ALDCELS, F629, and Lianjie Huang, EES-16, D452
Colloquium Chair: Jolante Van Wijk, EES-16
Vice Chair: Eric Nelson, XCP-8, F605
Colloquium Coordinator: Jeanette Gallegos, SRO, M714
Colloquium Coordinator: Matthew Quintana, SRO, J978