The Chinese University of Hong Kong

## Department of Biomedical Engineering

**Time: 3:00 pm, 1 August 2019 (Thursday)**
**Venue: Room 513, William M.W. Mong Engineering Building**

# Advances in optical coded-aperture imaging: listening to cellular dynamics and visualizing light-speed phenomena


## Jinyang Liang, Ph.D.

**Assistant Professor**
**Laboratory of Applied Computational Imaging (LACI)**
**Centre Énergie Matériaux Télécommunications**
**Institut National de la Recherche Scientifique (INRS)**



## Abstract

Coded apertures have been exploited in various imaging modalities to enhance their performance. The unique paradigm of data acquisition and imaging reconstruction in coded-aperture imaging has extended the operating spectral range and enabled a myriad of applications, especially where conventional imaging systems are inapplicable. This presentation briefly reviews the coded-aperture imaging technique and concentrates on our recent efforts to build next-generation photoacoustic and optical coded-aperture imaging systems. The first part of this presentation will touch on coded-aperture photoacoustic microscopy (PAM). I will discuss schemes of spatial encoding and multiplexing that benefit PAM by improving image quality [Opt. Lett. 39, 430 (2014)], by enabling measurement of physiological biomarkers [J. Biomed. Opt. 21, 020501 (2016); J. Biomed. Opt. 18, 096004 (2013)], and by enhancing the imaging speed and depth [Opt. Lett. 38, 2683 (2013); Opt. Lett. 39, 5499 (2014)]. In the second part of this presentation, I will discuss the development and applications of compressed ultrafast photography (CUP) [Nature 561, 74 (2014); Science Adv. 3, e1601814 (2017)]—the world's fastest single-shot receive-only camera—imaging at up to 10 trillion frames per second [Light-Sci. Appl. 7, 42 (2018)]. I will also present recent implementation of the concept of CUP in dynamic transmission electron microscopy [Micron 117, 47 (2019)] and optical microscopy with standard CCD/CMOS cameras [Opt. Lett. 44, 1387 (2019)]. Their prospects in biomedical applications will also be briefly discussed.


## Biography

Dr. Jinyang Liang is an Assistant Professor at the Institut National de la Recherche Scientifique (INRS) - Université du Québec. His research interests cover ultrafast imaging, high-precision laser beam shaping, and photoacoustic microscopy. His research primarily focuses on implementing optical modulation techniques to develop new optical instruments for applications in physics and biology. He has published over 50 journal papers and conference proceedings, including Nature (cover story), Science Advances, and Light: Science & Applications. He has applied for seven U.S. patents on ultrafast optical imaging technologies. He is an Associate Editor of OSA's Photonics Research. He received the FRQS' research scholarship (2019–2022), the 2019 Young Scientist Prize from IUPAP, the 2017 Educational Award–Gold from Edmund Optics, and the 2017 Discovery Accelerator Supplement Award from NSERC. He received his B.E. degree in Optoelectronic Engineering from Beijing Institute of Technology in 2007, and his M.S. and Ph.D. degrees in Electrical Engineering from the University of Texas at Austin, in 2009 and 2012. From 2012 to 2017, he was a postdoctoral trainee in Washington University in St. Louis and California Institute of Technology.

***** ALL ARE WELCOME *****

*For enquiries, please contact Ms. Joyce Chan, Department of Biomedical Engineering at 3943 8278*