



THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering
Seminar

**Wavefront Shaping x Signal Processing:
High-Capacity and Spectral-Efficient Optical Communications**

By

Dr. Runzhou Zhang
Amazon Web Services (AWS), USA

Date : 29 January 2024 (Monday)

Time : 11:30am – 12:30pm

Venue : Rm 801, Ho Sin Hang Engineering Building, CUHK

Abstract

In light of the exploding AI/ML computing throughput, there has been growing interest in enhancing the capacity, efficiency and resiliency of high-speed optical communications and networking. Optical wave, due to its high carrier frequency (approximately 200 THz), is able to provide high data capacity in a variety of high-throughput data transmission schemes and applications, including but not limited to: free-space optical communications, optical fiber communications, and chip-chip optical interconnect. In lightwave systems, data is typically encoded and decoded in the temporal and phase of the optical waves, largely enabled by digital signal processing. To further enhance system performance, one can exploit light's spatial degree of freedom, i.e., shaping wavefront structure of an optical beam, to enhance the data capacity, spectral efficiency, and distortion resiliency of optical data transmission. In this seminar, we will discuss the speaker's recent work and perspective on utilizing wavefront shaping together with signal processing techniques to achieve high-capacity and spectral-efficient optical communications. Specifically, this seminar will cover: (i) turbulence-resilient free-space-optical communications and (ii) mode-division-multiplexed optical transmission in random media (atmosphere turbulence, turbidity, few-mode fiber etc)

Biography

Dr. Runzhou Zhang obtained Ph.D in Electrical Engineering from University of Southern California (USC, Los Angeles, U.S.) in 2022, advised by Prof. Alan E. Willner. Prior to joining USC, he obtained B.Eng in Information Engineering from Zhejiang University (Hangzhou, China) in 2016. Since May 2022, he has been working in Amazon Web Services (AWS) as an Optical Network Engineer, focusing on research and development of next-generation AWS data-center interconnect. Dr. Zhang has been the 1st author of >15 peer-reviewed journal articles and conference proceedings, co-authored over 100 publications in the field of optics, photonics, and communications, including Nature Photonics, Nature Communications, Optics Letters, Journal of Lightwave Technology, OFC, ECOC, CLEO, etc. He was an invited speaker at OFC 2023 (San Diego, U.S.). Dr. Zhang is also the recipient of various selected awards, including 2021 PSC Tingyi Li Memorial Scholarship, 2020 Qualcomm Innovation Fellowship, and 2016 USC Annenberg Ph.D Fellowship.

**** ALL ARE WELCOME ****