



Correlations in complex light scattering and its applications in pharmaceutical industries



Dr. ZHANG Qihang
Postdoctoral Fellow
Tsinghua University

Date : 8 November 2024 (Friday)
Time : 10:30am
Venue : **Room 402**, William M W Mong Engineering Building, CUHK

Abstract

Disordered media, such as fog, powder, emulsion, and biological tissue, induce complex distortion of light, resulting in intricate speckle patterns. The speckle correlation aids in understanding, manipulating, and reconstructing the field, forming the basis of applications such as imaging through turbid materials, complex beam shaping, and surface characterization. However, neglecting decorrelation becomes a bottleneck in these applications, particularly in the multi-scattering regime. This seminar will report the development of decorrelation models and the latest applications in surface characterization. We proposed an analytical formula for speckle decorrelation under general scattering conditions, achieving state-of-the-art accuracy even for strong and multi-scattering cases, potentially providing an advanced forward model for various inverse problems. Based on our theoretical models, we invented the first non-invasive, in-line and quantitative probe for particle size estimation in the pharmaceutical drying, blending and mixing processes.

Biography

Qihang Zhang is currently a postdoc at Tsinghua University. He got his bachelor's degree from the physics department of Tsinghua University in 2018 and got his Ph.D. from MIT electrical engineering and computer science department in 2023. He works on computational optics and develops novel approaches to combine machine learning and physical systems in different scenarios. His works were published in Nature Communications, Light: Science and Applications, and Optics Letters. Some related work was also reported by MIT News.

*** ALL ARE WELCOME ***

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