



THE CHINESE UNIVERSITY OF HONG KONG
Department of Physics
SEMINAR

Towards Next-Generation Astronomical Instrumentation: Contributions from Astrophotonics

by

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Time: 3:00 - 4:00 p.m.

Place: Rm G25, Science Centre North Block, CUHK

ALL INTERESTED ARE WELCOME

Abstract

Optical fiber technology has emerged as a transformative element in modern astronomical instrumentation, offering capabilities to manipulate light at photon scale -- often a challenge for conventional bulk optics. Astrophotonics focuses on integrating cutting-edge photonic techniques into astronomical instruments, aiming to enhance their performance and explore new avenues for observation. A pivotal challenge in this integration involves the efficient and low-loss conversion of multimode light inputs into single-mode waveguides.

This talk will introduce the design, functionality, and astronomical applications of two significant astrophotonic devices: the photonic lantern and the aperiodic fiber Bragg grating. The photonic lantern, a specially tapered optical fiber bundle device, facilitates a highly efficient transition from multimode to single-mode light propagation. This innovation is crucial as it enables the precise manipulation of astronomical signals within functional single-mode waveguides, unlocking advanced spectroscopic and interferometric techniques.

Furthermore, we will explore the aperiodic fiber Bragg grating, an optical fiber device with a sophisticated-designed refractive index profile inscribed by UV laser. Its customizable nature allows flexible generation of comb-like spectral responses, offering tailored solutions for diverse astronomical filtering and sensing requirements. This talk will highlight the principles and diverse applications of these techniques, and outline their potential impact on the future of astronomical observation and instrumentation.

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