



DEPARTMENT OF PHYSICS
THE UNIVERSITY OF HONG KONG



香港天文與天體物理研究所
THE HONG KONG INSTITUTE FOR
ASTRONOMY AND ASTROPHYSICS

HKIAA SEMINAR SERIES

Testing modified gravity theories of dark energy with gravitational-wave observations

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ABSTRACT

Cosmic acceleration may arise from modifications to gravity that become significant on cosmological scales. In many scalar–tensor and effective-field-theory models, an evolving effective gravitational coupling modifies the propagation of gravitational waves (GWs). This introduces additional damping, causing the GW luminosity distance to differ from its electromagnetic counterpart. Some modified-gravity theories may also predict an energy-dependent GW propagation speed. In this talk, I will present constraints on dark-energy-related modifications to gravity using observations from the LIGO–Virgo–KAGRA O4 run. We employ a hierarchical dark-siren analysis that jointly models cosmology and compact-binary population properties, incorporating information from galaxy catalogs. I will discuss constraints on phenomenological parameterizations motivated by scalar–tensor and higher-dimensional theories of gravity. Although the current results are consistent with general relativity, they demonstrate that GW propagation provides an independent probe of gravity over cosmological distances. I will also present forecasts for testing modified GW dispersion with future space-based observatories such as LISA, and joint multiband observation with LISA and LVK.

BIOGRAPHY

I am a postdoctoral fellow at the International Centre for Theoretical Physics Asia-Pacific (ICTP-AP) at the University of Chinese Academy of Sciences. I completed my PhD at Queen Mary University of London in 2024. My research lies at the intersection of cosmology and gravitational-wave (GW) astrophysics, with a primary focus on testing the fundamental laws of gravity. I develop novel data-analysis tools to extract cosmological information from GW signals—including the dark siren method, multiband waveform analysis, and gravitational lensing effects. I am an active member of the LIGO–Virgo–KAGRA (LVK) Collaboration, and I currently serve as a co-chair of the LVK's Tests of Λ CDM Cosmology subgroup.

30 September 2026 (Wednesday)

2:00 PM – 3:00 PM

Venue: Room 522, 5/F, Chong Yuet Ming Physics Building

Department of Physics, The University of Hong Kong

Anyone interested is welcome to attend.



ZOOM FOR ONLINE PARTICIPANTS

Meeting ID 964 7297 1072

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