



**THE CHINESE UNIVERSITY OF HONG KONG**  
**Department of Physics**  
**SEMINAR**

# **Testing Modified Gravity Theories of Dark Energy with Gravitational-Wave Observations**

*by*

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*Time: 1:30 - 2:15 p.m.*

*Place: Rm LG23, Science Centre North Block, CUHK*

ALL INTERESTED ARE WELCOME  
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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. Finally, I will discuss the prospects for using strongly lensed GW events to place complementary constraints on modified gravity with next-generation observations.