



Physics Colloquium

The Emergence of the First Massive Black Holes



March 18, 2026 (Wednesday)



10: 30 a.m.



CPD-G.02, Central Podium Levels –
Ground, Centennial Campus, HKU



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Abstract:

Little Red Dots (LRDs) are a newly identified population of active galactic nuclei (AGNs) uncovered by JWST deep surveys. Their enigmatic properties challenge the standard AGN paradigm and offer new clues to the early formation and rapid growth of massive black holes. LRDs show distinct UV-optical spectral energy distributions, including a clear V-shaped continuum with a universal turnover near 4000 \AA , broad emission lines, and the absence of classical AGN signatures such as hot dust and X-ray corona emission. The coexistence of broad-line emission with prominent Balmer absorption and break features on LRD spectra, none of which can be explained by evolved stellar populations, suggests that nuclear black holes are deeply enshrouded by dense gas with a nearly 100% covering fraction. Such conditions can naturally reproduce the red optical and flat near-infrared continuum spectra without invoking dust reddening, when the absorbing gas clouds are optically thick and their reprocessed emission shapes a thermal spectrum. In this talk, I will review the physical processes regarding the gas-enshrouded AGN interpretation for the LRD's mysterious nature and discuss a crucial role of LRDs bridging the first-generation of early black holes and ultra-massive black holes powering luminous quasars at lower redshifts.

Biography:

Dr. Inayoshi is an associate professor in Kavli Institute for Astronomy and Astrophysics, Peking University. Before joining KIAA in the fall of 2018, Dr. Inayoshi spent 4 years at Columbia University in US as a Junior Simons Fellow. He received his Ph.D. in physics from Kyoto University, Japan, in 2014.