



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

Linking Multiwavelength Pulsar Emission to Super-Dense Physics inside neutron star

ABSTRACT

Neutron-star observations are now precise enough that the next major advances will depend not only on better data, but also on more physical forward models and more powerful inference tools. In this talk, I will present a research program aimed at connecting pulsar magnetospheric physics, X-ray pulse-profile modeling, and dense-matter inference within a unified framework. I will first highlight new results that derive, from first principles and in analytic form, the surface return-current distribution in multipolar pulsar magnetospheres, providing a physically consistent route from global magnetic geometry to polar-cap heating and X-ray pulse profile. I will then briefly introduce two computational frameworks that make this broader program practical: a new public GPU-accelerated X-ray pulse-profile modeling framework, which reduces high-fidelity waveform evaluations from minutes to milliseconds, and CompactObject, an open-source full-scope platform for neutron-star equation-of-state inference that combines X-ray, gravitational-wave, radio, and nuclear constraints. Together, these developments provide a pathway from first-principles pulsar physics to robust neutron star dense matter constraints, with ongoing applications including physics-motivated hotspot inference for PSR J0740+6620 using NICER data and future NewAthena mission.

SPEAKER

Mr. Chun HUANG

WASHINGTON UNIVERSITY IN ST. LOUIS

Chun Huang is currently a fourth-year PhD student at Washington University in St. Louis, working with Professor Alexander Chen. He received his undergraduate degree from Central China Normal University, where he worked with Professor Xiaoping Zheng. During his undergraduate, he conducted an undergraduate research internship with Professor Anna Watts at the University of Amsterdam. His research interests span neutron-star and pulsar physics, with particular emphasis on X-ray pulse-profile modeling for current and future X-ray telescope, pulsar magnetospheres modeling, and, more recently, radio-emission modeling.

31 July 2026 (Friday)

4:00 – 5:00 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

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