THE UNIVERSITY OF HONG KONG

DEPARTMENT OF PHYSICS
RESEARCH SEMINAR

Star formation and evolution in AGN disks, with application to Little Red Dots

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Abstract:
Study of stellar objects embedded in AGN accretion disks has been motivated by i) the disk(s) of stars that possibly formed in-situ in the galactic center; ii) the super-solar metallicity of classical quasars independent of redshift; iii) star-related transients in AGNs, and iv) LIGO-Virgo gravitational wave sources potentially born in gas rich environments. In this talk, I will introduce some recent progress on (magneto-)radiation hydrodynamic simulations of stellar evolution in AGN disks, focusing on their formation process from fragmentation of a gravitationally unstable disk and their accretion process in a stratified gas-rich background. We argue that a population of such stars is able to power an extended, optically thick and marginally gravitationally stable disk region generate a red bump of universal Teff~5000K in its Spectral Energy Distribution, which can be invoked to explain continuum features of Little Red Dots and connect them with AGNs in a unified evolutionary picture.

Biography:
Yi-Xian Chen is a PhD candidate at the Department of Astrophysical Sciences, Princeton University, advised by Jeremy Goodman. He obtained his BS in Physics at Tsinghua University in 2021, advised by Douglas Lin. His research interests include planet formation, planet atmospheres, and applying frameworks of protoplanetary disk studies to processes in AGN and collapsar disks. His thesis focuses on using hydrodynamic simulations to study the formation and evolution of massive stars in AGN disks. He is expected to join the Flatiron Institute as a Research Fellow in 2026 and Berkeley as a Miller Fellow in 2027.

Thursday, May 14, 2026, 4:15pm

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Anyone interested is welcome to attend.