Astronomy Seminar

李政道研究所
TSUNG-DAO LEE INSTITUTE

Dr. Zhefu Yu

Standford University

Mapping the growth of supermassive black holes through reverberation

Time: 15:00-16:00, 6 August (Tuesday), Shanghai time

Venue： N600（TDLI）

Host: Ying Zu (祖颖）、Gwenael Giacinti

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Abstract:

How supermassive black holes (SMBHs) form and grow over cosmic time is one of the key questions in astrophysics. Accurate SMBH mass measurements, and a clear understanding of the accretion process, are both critical for answering this question. Outside the local Universe, reverberation mapping (RM) of active galactic nuclei (AGN) is the major method for measuring SMBH masses. RM measures the time lag between the continuum and broad emission line region (BLR) variability of AGN, which gives the virial mass when combined with the broad line width. I will first present the SMBH mass measurements from the Australian Dark Energy Survey (OzDES) RM project based on Mg II lags. Our results include a new relationship between the radius of the Mg II BLR and the continuum luminosity, which is extremely important because it is widely used to estimate the masses for large numbers of SMBHs from single-epoch spectra at cosmic noon – the peak of AGN activity. RM is also a powerful technique for probing the accretion disk using time lags between different wavelengths of the continuum. Based on extensive disk RM studies in both optical and X-ray wavelengths, I will present new insights into the accretion flow from the low-temperature outer disk to the innermost region near the event horizon of the SMBH.

Biography:

Zhefu Yu is a postdoctoral fellow in the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) in Stanford University. He got his bachelor's degree in Peking University in 2017, and he got his PhD degree in The Ohio State University in 2023. His research aims to understand how supermassive black holes (SMBHs) grow over cosmic time, one of the key questions in astrophysics. He has done substantial work in accurately measuring SMBH mass through reverberation mapping (RM) of active galactic nuclei (AGN). In particular, he derived a new relationship between the radius of the Mg II broad line region and the continuum luminosity based on the OzDES RM project, which is critical for SMBH mass measurements and demographic studies in cosmic noon – the peak of AGN activity. He has also led extensive studies on understanding the accretion physics in both AGN and quiescent SMBHs.

Astronomy and Astrophysics Division
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