



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

Physics
Colloquium

Physics Colloquium

Strong lensing by galaxy clusters: from detailed modeling to statistical lensing



October 28, 2026 (Wednesday)



3:30 p.m.



**MB237, 2/F, Main Building,
Main Campus, HKU**



Prof. Massimo MENEGHETTI

INAF Observatory of Astrophysics and Space Science (OAS)

Abstract:

The inner regions of galaxy clusters provide unique laboratories for testing the predictions of the cold dark matter (CDM) paradigm and investigating the role of environmental processes in shaping galaxy formation and evolution. Strong gravitational lensing offers a powerful means of probing the mass distribution of galaxy clusters, from the scales of individual galaxies to the large-scale cluster environment.

In this talk, I will review the state of the art in galaxy cluster mass modeling, highlighting how the combination of high-resolution imaging and spectroscopic observations enables increasingly precise reconstructions of their mass distributions. I will then discuss the ongoing transition from detailed modeling of individual systems to statistical strong-lensing studies of large cluster samples. In particular, I will present ongoing efforts to assemble an unprecedented sample of strong-lensing galaxy clusters using observations from the Euclid mission. Finally, I will introduce recent work aimed at developing a large, publicly accessible database of simulated gravitational lenses, designed to enable systematic statistical comparisons between observations and theoretical predictions. Together, these developments open new opportunities to test the CDM paradigm and improve our understanding of the interplay between dark matter and baryonic processes in galaxy clusters.

Biography:

Massimo Meneghetti is Director of Research at the INAF Observatory of Astrophysics and Space Science (OAS) in Bologna, Italy. Before joining INAF, he worked at the Institute for Theoretical Astrophysics at Heidelberg University and at the Jet Propulsion Laboratory/Caltech in Pasadena, USA.

His research focuses primarily on cosmology and the formation and evolution of cosmic structures. In particular, he has worked extensively on gravitational lensing by galaxies and galaxy clusters. He has been involved in several major international collaborations and observational programs, including CLASH, the Hubble Frontier Fields, and several JWST programs, using gravitational lensing to investigate the mass distribution of cosmic structures, constrain the nature of dark matter, and probe the high-redshift Universe.

He is a Founder of the Euclid mission. He served as coordinator of the Euclid Strong Lensing Working Group and currently coordinates a Euclid Key Project dedicated to strong-lensing galaxy clusters.

Jointly organised by the Department of Physics and the HKIAA

Anyone interested is welcome to attend.

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