東北大学　宇宙創成物理学国際共同大学院プログラム

GPPU Seminar

“Illuminating the Cosmic Web and Galaxy Formation in the Young Universe with the help of Supermassive Black-Holes”

by Sebastiano Cantalupo (University of Milano-Bicocca)

Time and Date: 13:00 - 15:00, November 10, 2025

Place: Room 745, Science Complex B (H-03) (hybrid)

Registration: "https://us02web.zoom.us/meeting/register/htWe8OYmSjumPSRGRtf1DA"

Abstract:

Our standard cosmological model predicts that most of the matter in the universe is distributed into a network of filaments - the Cosmic Web - in which galaxies form and evolve. Because most of this material is too diffuse to form stars, it has remained “dark” and thus non-detected with our optical telescopes until recently leaving fundamental questions still open, including: How do galaxies form within the Cosmic We and how are they linked to each other? What are the morphological, physical and kinematical properties of the Cosmic Web on both large and small scales? How do they affect galaxy and massive black-holes formation and evolution? In this seminar, I will review the results of the revolutionary observations in the last decade that allow us to address the questions above through direct imaging of the Cosmic Web using active supermassive black-holes, i.e. “quasars”, as “cosmic flashlights”. In particular, I will focus on regions of the universe that are particularly rich in galaxies and actively accreting supermassive black-holes at an epoch that corresponds to a universe age of a few billion years, the peak epoch of galaxy and quasar formation. I will discuss how these new observations can provide new learning opportunities for our understanding of the physical properties of galaxies and its connection with the surrounding Cosmic Web. At the same time, I will show how these rich environment can reveal Cosmic Web filaments and galaxies with surprising properties challenging our expectations based on our previous models.

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