Astrophysics Colloquium

Prof. Fulai Guo

(SHAO)

Energetic Feedback from Galactic Nuclei: Fermi Bubbles and Beyond

Time: 15:00-16:00, 23 April (Tuesday) Shanghai time

Venue: N602（TDLI）

Host: Gwenael Giacinti

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Abstract:

The standard Lambda-Cold Dark Matter model of cosmology explains the large scale structure of the Universe quite well, but it encounters many outstanding problems while explaining small galaxy-scale phenomena, where energetic feedback from galactic nuclei is believed to play a key role in shaping the structure and evolution of galaxies. The nucleus of our own Galaxy, the Milky Way, is very quiescent compared to many other galaxies. However, recent observations show that it also hosts a series of energetic outbursts, including the well-known Fermi and eROSITA bubbles, the galactic center lobes, the central 15-pc Sgr A lobes. Are they long-lasting or explosive events? What kind of galactic nucleus feedback causes these structures? Are they cosmic-ray-acccelerating PeVatrons related to ultra high energy gamma ray emissions from the Galactic center? In this talk, I will describe our long journey to reveal the origin of the Fermi bubbles. Our recent jet-shock model could explain the X-ray, gamma-ray, and microwave observations of the Fermi bubbles, suggesting that they were produced by a pair of powerful jets emanating from the supermassive black hole at the Galactic center about 5 million years ago. We also use a jet-shock model related a recent tidal disruption event at the Galactic center to explain the origin of the inner 15-pc Sgr A lobes. I will also briefly discuss some ongoing works in my group exploring black hole and stellar feedback from the nuclei of several nearby galaxies.

Biography:

Prof. Fulai Guo is a faculty member in the astrophysics division of Shanghai Astronomical Observatory (SHAO), currently leading the “Black Hole Feedback and Cosmic Ray Astrophysics” research group. He received a B.S. degree in astrophysics from University of Science and Technology of China in 2001, and a PhD in Physics from University of California, Santa Barbara in 2008. He then worked consecutively as a postdoctoral researcher at University of California Santa Barbara and at University of California Santa Cruz (UCO/Lick Observatories). In 2012-2015, he was a Zwicky prize fellow at Swiss Federal Institute of Technology Zurich, and in 2015 he joined SHAO. He is a theorist with a wide range of research interests including black hole accretion and feedback, stellar feedback, cosmic ray astrophysics, galaxy evolution, etc.

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