Astronomy Interview Seminar

Dr. Jieshuang Wang

Max Planck Institute

Multi-messenger astrophysics from compact-star-driven relativistic outflows

Time: 16:00-17:00, 9 December (Monday), Shanghai time

Host: Dong Lai

Location: N600

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Abstract:

Multi-messenger observations, encompassing photons, neutrinos, cosmic rays, and gravitational waves, offer diverse and complementary perspectives for unraveling high-energy astrophysical phenomena and addressing fundamental questions in astrophysics. Compact stars and their associated relativistic outflows often serve as the central engines of these extreme events. In this talk, I will present two key topics in multi-messenger astrophysics. First, I will explore radio-galaxy jets as the origin of ultra-high-energy cosmic rays, highlighting the particle acceleration mechanisms and multi-wavelength spectral modeling of these sources. Second, I will investigate electromagnetic counterparts during the inspiral phase of neutron star mergers, focusing on magnetospheric interactions. Lastly, I will outline future projects aimed at developing a framework to study compact-star-driven transients and neutrino emissions. These projects will bridge theoretical studies with observations and be applied to phenomena such as outflow interactions from newborn accreting black holes or magnetars during supernovae, tidal disruption events, and flares in active galactic nuclei.

Biography:

Jieshuang Wang obtained his PhD in 2018 in Nanjing University. After completing his PhD, he joined the TDLI as a postdoctoral fellow. From 2021 to 2024, he was awarded an Alexander von Humboldt Fellowship and worked at the Max Planck Institute for Nuclear Physics in Germany. Since June 2024, he has been a postdoctoral researcher at the Max Planck Institute for Plasma Physics. His primary research focuses on high-energy astrophysics, particularly phenomena involving compact stars such as accreting black holes, neutron star binaries, and magnetars. He investigates dynamics, particle acceleration, and multi-messenger radiation through both analytical modeling and numerical simulations. He has authored more than 50 publications, which have collectively received over 2,000 citations.