



复旦大学物理系 Colloquium

Time: 14:00, Tuesday, 2023.10.31

Location: C108, Jiangwan Physics Building

Black Hole Information Loss Paradox and the AnaBHEL Experiment

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Abstract: The question of whether Hawking evaporation violates unitarity, and therefore results in the loss of information, has remained unresolved since Hawking's seminal discovery. To date, the investigations have remained mostly theoretical since it is almost impossible to settle this paradox through direct astrophysical black hole observations. An accelerating relativistic mirror has long been recognized as a viable setting where the physics mimics that of black hole Hawking radiation. In 2017, Chen and Mourou proposed a novel method to realize such a system by traversing an ultra-intense laser through a plasma target with a decreasing density. An international AnaBHEL (Analog Black Hole Evaporation via Lasers) Collaboration has been formed with the objectives of observing the analog Hawking radiation and shedding light on the information loss paradox. In this talk, we first provide an overview of the black hole information loss paradox, including its latest developments. We then describe the design and the status of AnaBHEL, whose R&D is in excellent progress.



Biography: Pisin Chen is currently the Distinguished Chair Professor of the Department of Physics, National Taiwan University (NTU). He is the founding Director and the Chee-Chun Leung Distinguished Chair Professor of Cosmology of the NTU Leung Center for Cosmology and Particle Astrophysics (LeCosPA) since 2007. He has made seminal contributions in plasma physics, particle beam physics, cosmology, particle astrophysics, classical and quantum black hole physics. He was elected Fellow of American Physical Society in 1994. In 2018, he was awarded with Blaise Pascal Chair by the government of Ile de France for his conception of the laser-induced flying plasma mirror as an analog black hole to investigate the Hawking radiation and the information loss paradox. He is a recipient of the 2023 European Physical Society Hannes Alfvén Prize for his invention of the plasma wakefield accelerator (PWFA). He led the experiment at SLAC, that successfully demonstrated the plasma lens principle in 2000 as he predicted in 1987. He is a two-time recipient (1994, 2002) of the Essays on Gravity competition awards organized by Gravity Research Foundation. He initiated and led the international ARA Observatory at the South Pole in 2009 to search for ultra-high energy cosmic neutrinos. In recent years, he extends his research interest to novel non-thermal pB fusion schemes.