Department of Physics
THE UNIVERSITY OF HONG KONG

Physics Colloquium

Formation of Coalescing Double Compact Object: What Have We Learnt from Gravitational-wave Observations So Far

Date: September 1, 2021 (Wednesday)
Time: 5:00 p.m.
Zoom Online Lecture:
https://bit.ly/3j9dUQ5
Meeting ID: 916 7091 3765
Password: 2859

Professor Tassos Fragos
University of Geneva

Abstract:
The detection of gravitational waves from coalescing binary black holes by the LIGO/Virgo observatories network allowed for the first time the direct observation of stellar-mass black holes, while the simultaneous gravitational wave and electromagnetic signal from the merger of two neutron stars provided the first direct evidence for origin of short gamma-ray bursts. These gravitational wave events, complemented by a half-a-century-long history of indirect observations of accreting compact objects in X-ray binaries, can give us now a more complete picture of the formation and evolution of binary stellar systems containing compact objects. At the same time, they also revealed weaknesses of the theories of stellar structure, binary evolution and compact object formation. In this talk, I will briefly review the current observed sample of gravitational-wave detections (the GWTC-2 catalogue) and their astrophysical implications, and discuss the different formation pathways that have been proposed in the literature to explain the properties of the observed populations. I will then highlight recent results from recent studies that aim at constraining the formation theories of coalescing double compact objects by statistically comparing them with GWTC-2, as well as other potential electromagnetic counterparts or precursors. Finally, I will close with a discussion of the "next-generation" models of double compact object formation that we are currently working on and what we expect that we will learn from them.

Biography:
Prof. Tassos Fragos is an assistant professor at the Astronomy Department, University of Geneva. His research interests include gravitational-wave astrophysics, compact object (black hole and neutron star) formation, high-energy astrophysics, and several aspects of stellar and binary evolution. Among his scientific achievements, most notable is the development of a unified theoretical framework explaining the origin of the black-hole spins measured in merging binary black holes and X-ray binaries, as well as his work on the evolution of X-ray binaries across cosmic time and their role in shaping the early Universe, as the dominant contributor to the heating of the intergalactic medium.

After completing his Ph.D. degree at Northwestern University, Prof. Fragos joined the Astronomy Department of Harvard University and the Harvard-Smithsonian Center for Astrophysics with a double prize postdoctoral fellowship (ITC and CfA fellowships). In 2014, he moved to the University of Geneva with an SNSF Ambizione fellowship, and in 2017 he joined the DARK center at the Niels Bohr Institute of the University of Copenhagen as an assistant professor. Since 2018, he is an assistant professor at the University of Geneva, where he also received an SNSF Professorship Career grant from the Swiss National Science Foundation.

Anyone interested is welcome to attend!

Phone: 28592360 Fax: 25599152