IOA Colloquium

Fate of Massive binaries

Gravitational wave sources/Supernova progenitors

Date 10:30 - 12:00, September 3 (Tuesday), 2024

Place 1131, Building 9 (Zoom ID: 881 5903 1592)

Speaker

Prof. Tomoya Kinugawa（衣川智弥）

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Abstract

We are in the era of multi-messenger astrophysics. The historical detections of gravitational waves (GWs) in 2015 and high-energy neutrinos in 2018 have opened new windows to study the physics of astrophysical phenomena. The development of multi-messenger probes is especially relevant for massive stars and compact objects. The majority of massive stars and compact objects are affected by interactions with nearby companion stars. These “binary” interactions alter the stellar interior structure as well as surrounding environment. In this talk, I will show how binary interactions affect multi-messenger signatures. Especially, I will talk about how to make the massive stellar binary black hole (more than 30 solar mass) like GW150914 and GW190521. We predicted the existence of about 30 solar mass binary black hole GW events, whose origin is the first-generation star (Pop III star), before the detection of the first GW event. LIGO's GW150914 paper (ApJL, 818, 22(2016)) cited ''recently predicted BBH total masses agree astonishingly well with GW150914 and can have sufficiently long merger times to occur in the nearby Universe (Kinugawa et al. 2014)." In this talk, I will explain Pop III binary evolutions and the properties of Pop III binary black hole mergers such as mass, spin, and merger rate density dependence on redshift. There is a good chance to check indirectly the existence of Pop III massive stars by GW.

Biography

Prof. Dr. Tomoya Kinugawa got his Ph.D in 2016 from Kyoto University. During 2016/4-2018/3, he worked in Institute for Cosmic ray Research as a PostDoc fellow. During 2018/4-2019/12, he worked in The University of Tokyo as JSPS SPD fellow. During 2020/1-2023/3, he worked in Institute for Cosmic ray Research as an assistant Professor. From 2023/3 to present, he works in Shinshu University as an associate Professor.