



THE CHINESE UNIVERSITY OF HONG KONG
Department of Physics
SEMINAR

Measurement and Applications of Black-Hole Recoils in Gravitational-Wave Astronomy: From Black-Hole Formation to Cosmology

by

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Time: 1:00 - 2:00 p.m.

Place: Rm 311, Science Centre North Block, CUHK

ALL INTERESTED ARE WELCOME

Abstract

With around 100 detections in their first three observing runs, the gravitational-wave detectors LIGO, Virgo and KAGRA have made the observation of black-hole mergers almost routine. This has allowed us not only to start to explore how these objects populate our universe but also gain important insights about black-hole formation, large-scale structure of the Universe and the behaviour of gravity in its strongest regime. Black-hole recoils are a strong-gravity effect by which the remnant of a black-hole merger can recoil at speeds up to $O(1000)$ km/s, enough to expel it from almost any host environment therefore greatly impacting hierarchical black-hole formation scenarios. I will present how black-hole recoils can be measured from gravitational-wave data, including the first existing measurements. Further, I will show how kick information can be applied in two very different fields. First, to reconstruct the formation history of black holes observed by LIGO Virgo and KAGRA. Second, to inform joint gravitational-electromagnetic observations of black-hole mergers occurring in Active Galactic Nuclei that can then serve as probes of the Hubble constant.