中央大學物理學系

Department of Physics, National Central University

Colloquium

Discoveries through LIGO's fourth gravitational wave observing run

Dr. Daiki Tanabe (田邉大樹)

Institute of Physics, Academia Sinica

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Abstract :

Through this decade, gravitational wave has become to a subject of precise measurement beyond merely a detection. It carries fertile information of massive compact objects in the universe and strong gravity field around them. A Joint observation of worldwide gravitational wave detector collaborations is detecting merger events from binary black holes or neutron stars once per three days. Recently, LIGO-Virgo-KAGRA collaboration has published results of the first part of their fourth observing run. The accumulated number of events counts 218, and signal-to-noise ratio of single detector of LIGO has reached to 53 at maximum. It enables us statistical studies of gravitational wave sources, and on the other hand, requires careful treatment of systematic error. The fourth observing run of LIGO-Virgo-KAGRA provided many keys to the fundamental cosmology and astrophysics, including a test of Hawking's area law, constraints on the Hubble constant, and suggestion to the origin of an intermediate mass black hole. In this talk, I will introduce major results from LIGO's recent observation and contributions of Taiwanese gravitational wave experiment group, followed by upgrades for the next observation run and expected scientific outcomes.