

Multi-Messenger Astronomy with 7-Dimensional Telescope

Wednesday, 14 June 2023 12:00 (30 minutes)

The 2017 detection of the binary neutron star (BNS) merger event in both gravitational wave (GW) and electromagnetic wave (EM), GW170817, has shown the great potential for multi-messenger astronomy, allowing us to understand the link between neutron star mergers and gamma-ray bursts, physical mechanisms and environments of the EM counterpart, kilonova (KN), and cosmology with GW sources. Yet, GW170817 is still the only GW event for which MMA was possible. With the start of the LVK O4 run in May 2023, the situation is now changing. The forecast is about 10 BNS merger event detections during O4, with many of them having a GW localization accuracy on par with GW170817. To capitalize on the anticipated GW source discoveries, we have prepared an optical EM follow-up network of telescopes named the Gravitational-wave EM Counterpart Korean Observatory (GECKO). In particular, we are now constructing a new facility, the 7-Dimensional Telescope (7DT) in Chile for multi-messenger astronomy. 7DT is a multiple-telescope system that can perform spectral mapping over a wide field of view ($> 1 \text{ deg}^2$) and will be efficient in catching KNe associated with future GW events. A partial system of 7DT started operation. In this talk, we will outline the current challenges of optical/NIR counterpart observations for the KNe discovery and outline our past GW optical follow-up activities. Then we will introduce 7DT and our observing strategy and early results using the telescope.

Secondary category for the parallel session (optional)

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