overview of the expected EM signals from GW sources and the current EM follow-up observations that have been undertaken in Korea and the world.

[구 GW-04] Gravitational Wave Astrophysics with the Superconducting Low-frequency Gravitational-wave Telescope

Sang-Hyeon Ahn[1], Yeong-Bok Bae[1], Gungwon Kang[2], Chunglee Kim[1], Whansun Kim[3], John J. Oh[3], Sang Hoon Oh[3], Chan Park[2], Edwin J. Son[3], Hyung Mok Lee[4], Hyungwon Lee[5], Hyunkyu Lee[6], Chang-Hwan Lee[7], Ho Jung Paik[8]
[1]Korea Astronomy & Space Science Institute, Center for Theoretical Astronomy, [2]Korea Institute of Science and Technology Information, Division of Supercomputing, [3]National Institute for Mathematical Sciences, Division of Industrial Mathematics, [4]Seoul National University, Dept. of Physics and Astronomy, [5]Inje University, Dept. of Computer Simulation, [6]Hanyang University, dept. of Physics, [7]Pusan National University, dept. of Physics, [8]U. of Maryland, USA, Dept. of Physics

Gravitational wave (GW) is a probe to observe compact objects (WD, NS, and BHs) in the Universe. Compact binary coalescences (CBCs) were expected to be primary sources of LIGO, VIRGO, and KAGRA. Indeed GW150914 from BH-BH binary coalescence at 430 Mpc was discovered by LIGO between 25-350 Hz. The total system mass of GW150914 is ~$70M_\odot$, and about $3M_\odot$ of energy is converted to GWs in 0.2s of the observation duration. In lower frequencies below 10 Hz, in addition to CBCs with 1-$100M_\odot$, more massive sources of ~1,000-$10{,}000M_\odot$ are observable for seconds up to days in time scale. We introduce GW astrophysics and present highlights of target sources for the proposed super conducting low-frequency gravitational-wave telescope (SLGT).

[구 GW-05] Stochastic Gravitational Wave Background in 0.1-10 Hz

Chan Park[1], Sang-Hyeon Ahn[2], Yeong-Bok Bae[2], Gungwon Kang[1], Chunglee Kim[2], Whansun Kim[3], John J. Oh[3], Sang Hoon Oh[3], Edwin J. Son[3], Yong Ho Lee[4]
[1]Korea Institute of Science and Technology Information, [2]Korea Astronomy & Space Science Institute, [3]National Institute for Mathematical Sciences, [4]Korea Research Institute of Standards and Science

Stochasitc gravitational wave background (SGWB) is expected to be contributed by primordial sources (e.g. inflation signature) and astrophysical sources (e.g., incoherent superposition of a large numbers of compact binary inspirals throughout in the Universe). Theoretically, SGWB is predicted to span in a broad frequency range between less than nHz up to kHz. Many gravitational-wave (GW) detectors such as LIGO or LISA aim to detect or constrain SGWB in different frequency band that is most sensitive for each detector. In this talk, we focus on the prospectives of constraining the energy density of SGWB between 0.1-10 Hz. We introduce the characteristics of SGWB and representative models for primordial and astrophysical sources. Then, we propose a signal extraction scheme to detect SGWB using one or several omni-directional GW detectors such as SLGT(Superconducting Low-frequency Gravitational-wave Telescope). Considering SLGT sensitivity, we discuss how to observe SGWB in 0.1-10 Hz if we have SLGT network. Finally, we highlight interesting SGWB models that can be constrained in 0.1-10 Hz with SLGT.

[구 GW-06] Binary Black Hole Inspirals and GW detection in 0.1-10 Hz

Yeong-Bok Bae[1], Sang-Hyeon Ahn[1], Gungwon Kang[2], Chunglee Kim[1], Whansun Kim[3], John J. Oh[3], Sang Hoon Oh[3], Chan Park[2], Edwin J. Son[3], Yong Ho Lee[4]
[1]Korea Astronomy & Space Science Institute, [2]Korea Institute of Science and Technology Information, [3]National Institute for Mathematical Sciences, [4]Korea Research Institute of Standards and Science

The pilot study of SLGT (Superconducting Low-frequency Gravitational-wave Telescope) is being performed by KKN (KASI-KISTI-NIMS) collaboration. In this presentation, we discuss prospectives of detecting GWs in the low-frequency band (0.1-10 Hz), which is a target frequency band of SLGT, but can be hardly observed by advanced LIGO. IMBHBs (Intermediate Mass Black Hole Binaries) and IMRIs (Intermediate Mass Ratio Inspirals) with total masses of O(1000) up to O(10,000) solar masses are most probable sources between 0.1-10 Hz. We estimate horizon distances and signal to noise ratios of IMBHBs and IMRIs for different SLGT design sensitivities. Based on our calculations, detection rates for IMBHBs and IMRIs with SLGT will be discussed.