

Multi-messenger Search for GW from LGRBs for CCSNe Collapsar Models

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ABSTRACT

We aim to put quantitative constraints on the fraction of long gamma-ray bursts (LGRBs) associated with broad-line type Ic SNe from observations of gravitational waves (GWs). By analyzing the waveforms from Ott et al. (2011) and the Piro & Thrane 12 (PT12) analytical model, we introduce a new set of phenomenological waveforms for BH formation and different types of stellar collapse. Through the investigation of the detectability of GWs from several emission mechanisms connected to neutron stars, super-luminous supernovae (SLSNe) and LGRBs in the context of Advanced LIGO and Advanced Virgo, in addition to proposed third-generation ground-based GW detectors, such as Einstein Telescope and LIGO Voyager, we propose a radio search focusing entirely on type Ic-BL SNe in low metallicity environments in order to determine a 90% chance of detecting an off-axis LGRB event.