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GRBs with afterglow plateaus during LIGO S6/O1/O2/O3 runs
DEVEN BHAKTA, Texas Tech University — Several Gamma-ray Burst (GRB) afterglow light curves show a so-called plateau phase in the X-rays. Theoretical models predict that a long-lived central engine, such as a highly magnetized neutron star (magnetar), could power this plateau phase by injecting energy into the afterglow shock. Under the hypothesis that the newly-born magnetar is secularly unstable, its presence could be probed directly by searching for long-lived gravitational waves (GWs) during the plateau. In this work, we estimate the number of GRBs that could be potential targets for further long-duration GW signal searches. We considered all GRBs detected by the Swift Burst Alert Telescope (BAT) from April 2019 to October 1st, corresponding to advanced LIGO third observing run (O3). For completeness, we also extended our analysis to the past runs, advanced LIGO first and second observing runs (O1, O2) and initial LIGO 6th Science run (S6). Overall, we estimate that in O2, O1 and S6 each, 10% of Swift-triggered GRBs show an X-ray plateau with at least 1000 s of double coincidence time from the LIGO detectors. Our initial analysis for O3 is compatible with our results from the past runs.

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