

Investigation of Narrow Spectral Artifacts and Lockloss Tagging

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LIGO data is imperfect, largely due to ongoing phenomena that interfere with data detection. As such, investigating certain disruptions in this gravitational wave detection is important for run analysis. This is true for both analyzing narrow spectrum artifacts over long searches (relevant to continuous wave searches), and for refining existing tools, which tag potential reasons for losing lock.

More specifically, change-point detection methods are proposed for identifying lines over LIGO noise. Our project incorporates using a window-sliding method to detect abrupt change-points over specified dates, which allows for understanding of narrow spectral artifacts.

Over the O4 run, a considerable number of locklosses are for unknown reasons. The Locklost tool correlates certain reasons for locklosses using Python plugins that tag events. This project involves developing a glitch plugin which establishes an amplitude threshold within a certain frame prior to the lockloss event itself. Furthermore, we are developing plugins that check for lockloss times in the input mode cleaner. These practices will ensure further refinement for detecting and analyzing various reasons for lockloss.