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Critical Coupling Likelihood: A new approach to integrate LIGO data quality with searches for gravitational waves from compact binary coalescence CRISTINA TORRES, LIGO Livingston Observatory, LIGO SCIENTIFIC COLLABORATION AND VIRGO COLLABORATION — As part of the current LIGO search for compact binary coalescence (CBC) gravitational waves (GW) we find ourselves trying to determine if noise is coupling into the instrument indirectly using our data quality knowledge. The Critical Coupling Likelihood (CCL) method will allow us to directly fold information about potential GW triggers directly into our search efforts. Using this technique we can quantitatively inspect the data quality of each individual CBC candidate, and make more rigorous cuts improving the quality of our search. The CCL method will give the CBC search the potential to integrate all of LIGO's physical and environmental monitors (PEM) into a search for gravitational waves. Using the CCL approach and assuming required models of uncoupled (background) and coupled (foreground) instrument states, we should be able to increase our ability to discriminate between noise sources, that can hamper our current search efforts, and, high quality gravitational wave signal candidates. We illustrate how the method works by demonstrating environmental coupling in LIGO S6 data. An approach like CCL will become increasingly important as we move into the Advanced LIGO era, as we go from the first GW detection to gravitational wave astronomy.

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