Searching for perturbed black-hole ringdown signals with a network of gravitational-wave detectors DIPONGKAR TALUKDER, SUKANTA BOSE, Washington State University — Several ground-based interferometric observatories, such as LIGO, Virgo, are taking data so that astronomers can search for gravitational-wave signals in them. One such signal is that arising from a perturbed black-hole, which can result from the coalescence of a compact binary. This signal is initially in the form of a superposition of quasi-normal modes. However, at late times the waveform, which is known as ringdown, is expected to be dominated by a single mode. The optimal method for searching such a signal buried in detector noise is to match-filter the detector's output with theoretically modeled waveforms. The coherent network statistic is optimal for detecting these signals in Gaussian noise. But in real noise, which is non-Gaussian and non-stationary, additional discriminators of noise artifacts are required for obtaining a (near-)optimal statistic. Here, we construct a multi-detector search statistic that combines the power of the coherent statistic and those discriminators. The efficiency of this new search statistic is compared with the existing "coincidence" search statistic, which does not check for the consistency of the phase of the signal in the separate detectors.

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