Fast Parameter Estimation of Binary Mergers for Multimessenger Follow-up DANIEL FINSTAD, DUNCAN BROWN, Syracuse University — Significant observational resources have been dedicated to electromagnetic follow-up of gravitational-wave events detected by Advanced LIGO and Virgo. As the sensitivity of LIGO and Virgo improves, the rate of sources detected will increase. Margalit Metzger (2019) have suggested that it may be necessary to prioritize observations of future events. Optimal prioritization requires a rapid measurement of a gravitational-wave event's masses and spins, as these can determine the nature of any electromagnetic emission. We extend the relative binning method of Cornish (2013) and Zackay et al. (2018) to a coherent detector-network statistic. We show that the method can be seeded from a matched-filter search and used in a Bayesian parameter measurement framework to produce marginalized posterior probability densities for the source's parameters within 20 minutes of detection on 32 CPU cores. We demonstrate that this algorithm produces unbiased estimates of the parameters with the same accuracy as running parameter estimation using the standard gravitational-wave likelihood. We encourage the adoption of this method in future LIGO–Virgo observing runs to allow fast dissemination of the parameters of detected events so that the observing community can make best use of its resources.

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