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Tuning advanced gravitational-wave detectors to optimally measure neutron-star merger waves LEO STEIN, MIT Kavli Institute — Next-generation gravitational wave detectors have the potential to bring us astrophysical information in yet unexplored regimes. One of the possibilities is learning about neutron stars' equations of state from the gravitational wave burst of a binary coalescence. Since these events are "bursty", one does not have the luxury of time-averaging to improve S/N; one can only hope to do better by "tuning" a detector network to have the noise performance which will be most informative about the physics. We present a Bayesian method for optimizing a detector network given a prior distribution of physical parameters which affect the gravitational wave signal. Each detection adds information about the parameter distribution, updating the posterior and the optimal detector configuration. We demonstrate the algorithm with toy signal and detector response models and predict whether tuning Advanced LIGO (via the signal recycling cavity) will be fruitful in accelerating our understanding of neutron stars through their mergers.

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