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Probing Fundamental Physics with Gravitational Waves: The Next Generation[1] SCOTT PERKINS, NICOLAS YUNES, University of Illinois at Urbana-Champaign, EMANUELE BERTI, Johns Hopkins University — Gravitational wave astronomy is allowing for a host of exciting new tests of fundamental physics, especially with regards to the gravitational interaction. To be better informed and prepared for the future, the scientific community needs accurate predictions concerning the effectiveness of various proposed detector networks. The efficacy of these tests of gravity depends sensitively on many details, but particularly on the distributions of merging binary black holes in Nature and the sensitivity and location of detectors over the next several decades. In this presentation, I will discuss a suite of simulations we have constructed to address this need for accurate modeling. To establish the accuracy of these simulations, the various components involved will be outlined, including the different population models we have used, the detector networks under consideration, and the statistical methodology employed. Finally, a brief summary of the most interesting results will be presented. These conclusions relate to the importance of future detector upgrades and proposed facilities, the importance of single high-SNR events as opposed to large catalogs of comparable-SNR events, and how these deductions change when considering specific theories as opposed to generic parameterizations.

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