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Impact of higher-order modes on detecting binary black hole coalescences LARNE PEKOWSKY, Georgia Institute of Technology, Center for Relativistic Astrophysics, JAMES HEALY, Georgia Institute of Technology, PABLO LAGUNA, DEIRDRE SHOEMAKER, Georgia Institute of Technology, Center for Relativistic Astrophysics — Thus far, modeled searches for the gravitational waves produced by the coalescence of compact binaries have used templates that include only the quadrupolar 2,2 mode. However, it is known that there can be significant power in higher-order modes. In some instances, neglecting these modes could seriously compromise detection. We demonstrate, using numerical relativity waveforms from the late inspiral and merger of binary black holes, how the inclusion of higher modes in a search can increase the sensitivity volume of Advanced LIGO. We also show which higher modes are most significant to ensure high sensitivity for systems with un-equal mass and spinning black holes.

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