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High Precision Ringdown Modeling: Multimode Fits and BMS Frames NEEV KHERA, Pennsylvania State University, LORENA MAGANA ZERTUCHE, University of Mississippi, KEEFE MITMAN, California Institute of Technology, LEO STEIN, University of Mississippi, MICHAEL BOYLE, Cornell University, NILS DEPPE, California Institute of Technology, NILS FISCHER, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), FRANCOIS HERBERT, California Institute of Technology, DANTE IOZZO, LAWRENCE KIDDER, Cornell University, JORDAN MOXON, California Institute of Technology, HARALD PFEIFFER, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), MARK SCHEEL, California Institute of Technology, SAUL TEUKOLSKY, Cornell University, California Institute of Technology, WILLIAM THROWE, Cornell University, SXS COLLABORATION — Quasi-normal mode (QNM) modeling is an invaluable tool for studying strong gravity, characterizing remnant black holes, and testing general relativity. To date, most studies have focused on the dominant $(2, 2)$ mode. But, as gravitational wave observatories become more sensitive, they can resolve higher-order modes. Multimode fits will be critically important, and in turn require a more thorough treatment of the asymptotic frame at null infinity. We present a technique to systematically fit a QNM model containing many modes, and also illustrate the importance of mapping the numerical waveforms to the correct Bondi-Metzner-Sachs frame of numerical simulations to obtain high accuracy.

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