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Probing the Binary Black Hole Merger Regime with Scalar Perturbations ELOISA BENTIVEGNA, DEIRDRE SHOEMAKER, IAN HINDER, FRANK HERRMANN, Pennsylvania State University — We present results obtained by scattering a scalar field off the curved background of a coalescing binary black hole system. A massless scalar field is evolved on a fixed background provided by hypersurfaces generated from a binary black hole inspiral. We show that the scalar field scattered from the merger region exhibits quasinormal ringing once a common apparent horizon surrounds the two black holes. This occurs earlier than the onset of the perturbative regime as measured by the start of the quasinormal ringing in the gravitational waveforms. We also use the scalar quasinormal frequency to associate a mass and a spin with each hypersurface, and observe the compatibility of this constraint with the horizon mass and spin computed from the dynamical horizon framework.

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