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**Developments in IRS Multi-Mode Waveforms** BERNARD KELLY, JOHN BAKER, NASA Goddard Space Flight Center — The IRS picture [Baker et al. PRD 78:044046 (2008); Kelly et al. 84:084009 (2011)] visualises black-hole-binary late-inspiral/merger/ringdown gravitational waveforms as being generated by a single rotating source, with most important waveform angular modes being locked in phase through merger into ringdown. This led to the development of late-merger/ringdown waveform templates for the dominant modes of the binary for nonspinning black holes, and for holes with aligned (non-precessing) spins. During development of the IRS model, it was noticed that certain subdominant modes — most notably the (3,2) mode — suffered from non-monotonic bumps in both frequency and amplitude, indicative of some kind of mode-mixing behavior. We report on the resolution of this "bumpy" behavior, and of consequent developments to the IRS waveforms across multiple significant angular modes.

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