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Visualizing Binary Black Hole Collisions and Gravitational Waves[1] TERESITA RAMIREZ AGUILAR, GEOFFREY LOVELACE, California State University Fullerton — Gravitational waves are ripples in the fabric of space and time, traveling at the speed of light predicted by Einsteins theory of relativity. One of the best sources of gravitational waves is binary black hole mergers, which are among the most violent events in the universe. On September 14 2015, Advanced LIGO (Laser Interferometer Gravitational-wave Observatory) successfully made the first gravitational wave detection. Since then, LIGO and Virgo have published four additional observations of gravitational waves from merging black holes. This poster presents a visualization of the merging black holes that LIGO and Virgo have observed so far, created by solving Einstein's equations of general relativity on supercomputers. This is the only way to model merging black holes, because all approximations fail near the time of merger. The video shows calculations of the black holes horizons and the emitted gravitational waves during the final few orbits as they spiral inwards, merge and ring down. Each calculation is consistent with one of the LIGO-Virgo observations.

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