

## **Whispers from space: Remarkable implications of the neutron star merger GW170817**

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The first double neutron star merger observed in gravitational waves was astonishingly close, allowing the kind of simultaneous GW and electromagnetic observation that hadn't been expected for several years. The first observation of the inspiral and coalescence of a double neutron star system was accompanied by a gamma-ray burst and then an array of electromagnetic counterparts, and the combined effort of the gravitational-wave and astronomy communities has led to dramatic advances along all of the anticipated avenues of multi-messenger astrophysics: Resolving the 50-year old mystery of short gamma-ray bursts; determining the origin of the heaviest elements, including the rare earths, platinum, gold and uranium; using the imprint of tides on the inspiral waveform and on the time to collapse to infer the behavior of cold matter above nuclear density; independently measuring the Hubble constant; and measuring the speed of gravitational waves. The talk will present these results with a set of quick derivations of the underlying physics.