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GW 170817 and other mergers. What happened? What are the implications? What should we expect now?

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The detection of gravitational waves and accompanying EM signals from a binary neutron star merger, GW 170817 was one of the most remarkable scientific achievements of the last decade. The discovery confirmed numerous long standing predictions, ranging from the mergers being the cosmic foundries of r-process elements to the origin of short gamma-ray bursts. It also revealed the potential of these events to serve as tools to explore new physics, ranging from the measurement of the Hubble constant on the largest scales to the estimations of the equation of state at ultra high densities at the smallest. I describe current understanding of what have we seen, I summarize some of the new understanding that has emerged and I discuss the prospects for future discoveries. Interestingly many of these ideas had to be revised following the late observations of the EM signals from GW 170817 and gravitational waves observations of other mergers during the O3 campaign.

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