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Detecting gravitational waves from unexpected sources.

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The detection of gravitational waves (GWs) from merging binary black holes in 2015 was a pivotal point that gave birth to GW Astronomy. Since then, LIGO and Virgo have observed many binaries, primarily black hole mergers, but also binary neutron stars and neutron star-black hole coalescences. These detections provide new insight into our Universe, and some of these events question our understanding of the Universe. For example, the discovery of an intermediate-mass black hole was unexpected and challenged the current astrophysical models. While we regularly observe binaries, some sources are yet waiting to be discovered. One of them is a core-collapse supernova that is an explosion of a massive star. Astronomers observe them regularly with optical telescopes, but we have not yet observed GWs from them. The searches for such unexpected, unknown, or poorly-modeled sources benefit from methods that use minimal assumptions on the signal morphology, typically referred to as burst methods. In my talk, I will discuss some of the recent discoveries of LIGO and Virgo in the context of burst searches. I will also talk about the prospects for the detection of GWs from a core-collapse supernova.