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Gravitational waves, neutron stars, and black holes

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The observation of gravitational waves will provide a new method for studying the universe. The strongest sources of gravitational waves are expected to be inspiralling binary black holes and neutron stars. This talk will review efforts to detect gravitational waves, and complementary efforts to predict these signals by solving the Einstein field equations of general relativity. Binaries with neutron stars are particularly interesting both for the rich physics of these stars, and because they may be progenitors for short, hard gamma-ray bursts. In the merger of two neutron stars, the final state may be either a strongly differentially rotating star or a black hole. Computational results showing both scenarios will be presented with gravitational wave extraction.