

# Binary Neutron Star Mergers and Nuclear Physics

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In this lecture I will review our understanding of the physics of binary neutron star mergers. Such events are powerful sources of gravitational waves and electromagnetic emission. Their dynamics is strongly influenced by the equation of state of neutron stars as well as by the emission of neutrinos and by the presence of strong magnetic fields. Among their electromagnetic emission, the most interesting ones are the production of bright emission in gamma rays (short gamma-ray bursts) and in the optical/infrared bands (the so-called kilonova emission). The latter is in particular strongly responsible for the production of the heaviest elements of the periodic table. In this lecture I will discuss both numerical results and observations.

Useful Reviews on this topic:

[1] ebook "Gravitational Waves: A New Window to the Universe"

<https://www.frontiersin.org/research-topics/11345/gravitational-waves-a-new-window-to-the-universe>

[2] Living Review in Relativity "Kilonovae" <https://link.springer.com/article/10.1007/s41114-019-0024-0>

[3] Review Collection "Binary Neutron Star mergers"

<https://link.springer.com/collections/jgeicbdiig>