Nuclear Physics in Astrophysics XI



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Neutron star mergers and their nucleosynthesis

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The discovery of a slowly inspiralling binary system of two neutron stars by Hulse and Taylor in 1974 made clear that the final fate of such a system would be a very violent collision between the compact stars and that - at the very least- "something interesting" would happen. Based on indirect and mostly theoretical arguments, such collisions where connected to gamma-ray bursts and also to the potential formation "rapid neutron capture", or r-process, elements. The firm experimental confirmation of these ideas, however, had to wait until August 2017 when the gravitational waves from a neutron star merger inspiral flooded the LIGO detectors for about one minute. Subsequently, telescopes all around the world detected a firework of electromagnetic emission all across the spectrum which demonstrated that some r-process was produced. In this talk I will give an overview over our current understanding of the heavy element formation in neutron star mergers.

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