

Nuclear fusion, neutron radiative capture, neutron star, and origin of elements

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This talk highlights the central role of the nucleosynthesis processes like the nuclear fusion or neutron induced reactions in the formation of the stable and radioactive elements. We also illustrate the birth of a neutron star, formed instantly after the death of a massive star as the gravitational collapse giving rise to a supernova explosion. Then the discussion is focused on the first ever observation of the merger of two neutron stars (Kilonova) by the detection of both gravitational waves and gamma rays on August 17, 2017 by the LIGO-Virgo Gravitational-wave detectors, Fermi Gamma-ray Space Telescope, and International Gamma-ray Astrophysics Laboratory, and the later detection of the X-ray, infrared radiations as well as the visible light by more than 70 telescopes in the world. The gamma spectra seen in this event confirms unambiguously that the neutron-star merger is the site of the formation of heavy elements like gold and platinum, and solves, therefore, a long debated puzzle on the origin of heavy elements. The talk should be interesting and inspiring to anyone with some general knowledge in nuclear physics.