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Heavy element nucleosynthesis as a probe of matter at the extremes

Thursday, 20 October 2022 17:00 (45 minutes)

Gabriel Martínez-Pinedo is awarded the Leibniz Prize 2022 in recognition of his outstanding work in theoretical astrophysics on the formation of the heavy elements. Heavy elements with atomic numbers beyond that of iron are created in the universe as a result of certain astrophysical processes and require extreme densities of neutrons. But the question of how these astrophysical processes take place was one of the unsolved problems of physics in the 21st century – and this is precisely where Martínez-Pinedo's research brought about a paradigm shift: it is not the collapse of heavy stars in supernova explosions that is the pivotal process here but the fusion of neutron stars. Based on this finding, Martínez-Pinedo was able to predict that such an event should be a thousand times brighter in terms of observation than the nova explosions known from the Milky Way; the term “kilo-nova” was created to describe this phenomenon. This prediction was actually verified when a neutron star merger was observed for the first time in 2017 using gravitational waves and telescopes.

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Session Classification: Topical talk