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Combining nuclear physics and multi-messenger observations

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Our knowledge about dense matter explored in the cores of neutron stars remains limited. Fortunately, the detections of gravitational waves emitted from the merger of neutron stars and the corresponding electromagnetic signals provide a new way of studying supranuclear-dense material. Making use of the strength of multi-messenger astronomy, one can combine the information obtained from gravitational-wave observations, the electromagnetic counterparts of merging neutron stars with the information provided by NICER, radio pulsar observations, and heavy-ion collision experiments to derive new constraints on the neutron-star equation. We outline how the combination of current theoretical knowledge, astrophysical observatories, and experimental facilities helps us to improve our knowledge about the supranuclear-dense equation of state and what we can expect from the next generation of experiments.

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