

Multi-messenger particle astrophysics

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I illustrate different techniques used in multi-messenger particle astrophysics relevant for the identification of the origin of the observed high-energy neutrinos, and their major challenges. These techniques range from generic approaches (such as the relationship between the diffuse gamma-ray and neutrino backgrounds if produced in the same interaction chain), over the secondary production in known environments (such as in cosmic microwave and infrared backgrounds), to the neutrino production in astrophysical objects with largely unknown target densities (such as GRBs and AGNs). One example for the future challenges is the spectrum and composition of the primary cosmic rays at the highest energies, and their impact on the neutrino production both from the sources themselves and from the propagation of the cosmic rays (cosmogenic neutrinos).

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