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Neutrino astrophysics

Neutrino astrophysics has brought milestones in our understanding of neutrino properties and of stellar evolution. Neutrinos are still tightly linked to key open questions in astrophysics, including unravelling the mechanisms of the death of massive stars and the site(s) where the heavy elements are made. Flavor oscillations in vacuum and in the Sun are well understood phenomena. However, neutrino flavor evolution in dense environments, such as core-collapse supernovae and accretion disks around binary neutron star mergers or black holes, is revealing many surprises. In particular neutrino self-interactions render the study of flavor evolution in media a complex many-body problem. In this talk I will highlight major advances in the field, the importance of future observations and its formal connection to condensed matter and to atomic nuclei.