

Kick-off meeting PRIN NAT-NET

Monday 27 January 2020 - Tuesday 28 January 2020

Department of Physics of the University of Naples Federico II

Scientific Programme

The NAT-NET theoretical and phenomenological research activities can be roughly structured into four working packages (WP) with strong connections among them and with present or future experimental searches:

WP1 - Standard neutrino framework. Investigation of the remaining unknowns of the three-neutrino framework (absolute masses and their ordering, Dirac/Majorana nature, CP phases); refinement of our understanding of neutrino oscillations in vacuum, in matter and with self-interactions; neutrinoless double beta decay with light Majorana neutrinos: constraints on its nuclear model uncertainties and connections with cosmological bounds.

WP2 - Beyond the standard neutrino framework. Sterile neutrino oscillations in the light of upcoming laboratory and cosmological data; constraints on new neutrino interactions; neutrinoless double beta decay beyond light Majorana neutrinos; long-distance and multi-messenger tests of dispersion relations; neutrinos as components or signals of dark matter; neutrino model building and leptogenesis.

WP3 - Sources and fluxes of neutrinos and of other messengers. From low to high energy: relic neutrino detection prospects; axions and axion-like particles in astrophysical contexts; issues in big-bang nucleosynthesis neutrinos; improvements of solar neutrino models and low-energy flux detection; set-up of a reference geo-neutrino model; tests of core-collapse supernova physics; high-energy neutrinos: study of astrophysical sources (within a multimessenger approach) and of propagation in the Earth.

WP4 - The standard cosmological model and beyond. Nonstandard scenarios for the relic neutrino background and big-bang nucleosynthesis; pre-big-bang and string cosmology; effects of large-scale inhomogeneities and anisotropies; laboratory approaches to vacuum energy; warm dark matter components via heavy neutrinos.