

1. Neutrino oscillations

Silvia Pascoli (Durham) Theories of neutrino masses and leptonic CP violation

Eligio Lisi (INFN Bari) Precision determination of neutrino mass-mixing parameters

Mauro Mezzetto (INFN Padova) Prospects for the measurement of the nu Mass ordering and leptonic CP violation

Federico Sanchez (Geneva U) Meas. of Nu-nucleus cross sections and nu flux

2. Neutrino mass and new states

Susanne Mertens (TUM) Measurements of the neutrino mass

Bonnie Fleming (Yale) Prospects for the search of sterile neutrinos

Nicola Serra (Zurich U) Prospects for the search of Heavy Neutral Leptons

3. Cosmic messengers

Andreas Haungs (Karlsruhe) Cosmic ray physics

Francis Halzen (Winsconsin) Neutrino astroparticle physics

B.S. Sathyaprakash (Penn State) Gravitational waves

Marek Kowalski (DESY) Multimessenger physics

Big questions

What is the origin of the neutrino masses ?

What is the optimal strategy towards a complete set of measurements of neutrino oscillation parameters and towards a precision global fit of the PMNS matrix ?

Is the existing experimental program (reactor, SBL) sufficient to confirm or exclude the existence of sterile neutrino states with masses in the eV/c^2 range ?

How to search for heavy neutral leptons with present and future facilities ?

Is gravity described by the Einstein theory of general relativity?

How do gravitational waves help to understand Dark Sector of the universe?

What is the proton-proton cross section at ultra-high energies?

How can cosmic neutrino's help to pin-down their properties - oscillations and mass hierarchy?

PMNS-related questions

- The current program of first measurements (delta, θ_{12} , octant) with DUNE, HK, JUNO, ORCA should continue to be a high priority
- The CERN Neutrino Platform has been a very successful realization, its support should be secured and reinforced.
- Do we agree that precision (to what level?) is needed for the mass and mixing parameters ?
- Do we agree we should go for more precise measurements of delta ? → In the long term new technologies will be needed, particularly the development of new neutrino beams technologies
- New projects (like Nustorm, Enubet ...) need the support of CERN accelerator experts.
- The community in the no-man's land between nuclear and particle physics needs support. Point to be raised in the briefing book. Ideas ? (like a nu cross-section center to be supported in a laboratory, a EU-funded program, ...)
- Other facilities, needs, issues ?

Measurements of the neutrino mass

- Program in the APPEC roadmap
- Roadmap, choice of technologies etc not discussed here
- Should be recognized in the Briefing Book as a very high priority for neutrino physics

HNL

- - HNL offer a natural mechanism for neutrino masses via Yukawa couplings and at the same time they might give explanation for matter-antimatter asymmetry and maybe even Dark Matter
- - The possible parameter space for HNL is huge, goes from sub-ev to GUT scale. It is important to search for these particles wherever we can
- - Using a set of experiments, in the future, it is possible to cover a large part of the parameter space, where large means several order of magnitudes but it is of course always small with respect to sub-ev/GUT range
- - Searches for HNLs at colliders HL-LHC/FCC and beam-dump/symbiotic experiments like FASER/MATHUSLA/CODEX-b are complementary
- It is important to design experiments that can measure properties of these particles if discovered. Measure properties and convince the world you are observing signal.

Sterile neutrinos

- The situation needs to be clarified: SBL program at FNAL, reactor neutrino experiments
- Strong tension with other measurements
- Need to reassess the field in a few years
- Future facilities with sterile neutrinos as one of their measurements ?