

Neutrino Tagging

The recent technological progresses in silicon pixel detectors are opening new avenues for accelerator based neutrino experiments. Indeed, at neutrino beams, these detectors could allow to track all beam charged particles. Such information would allow to reconstruct individually all the $\pi^\pm \rightarrow \mu^\pm \nu$ decays which is the major source of beam neutrinos. As a result, the flavour and chirality of each of these neutrinos will be known, and, using the decay kinematics, the neutrinos direction and energy will be determined precisely.

These tag-neutrinos could then be individually associated to the neutrinos interacting in the detector, using time and space coincidence. This association would allow to perform physics analyses with unprecedented energy resolutions and reduced systematic uncertainties which would dramatically change the reach of both short and long base line experiments.

The contribution will report on the feasibility of this technique based on simulations. It will also report on the on-going experimental demonstration of the neutrino tagging at CERN. Finally, it will present a case study for a long base line tagged neutrino experiment from the U70 accelerator complex in Protvino, Russia, to the KM3NeT-ORCA neutrino telescope and its potential to measure precisely the leptonic CP violating phase.

Working group

WG6

Primary author: PERRIN-TERRIN, Mathieu (Centre National de la Recherche Scientifique (FR))

Presenter: PERRIN-TERRIN, Mathieu (Centre National de la Recherche Scientifique (FR))

Session Classification: Poster session NB: do not use Safari; use Firefox, Chrome or Edge