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Precise Measurement of delta at Accelerator Experiments Using Only Neutrino Sector

Several experiments in the next few years will determine the value of the CP-violating phase δ. In accelerator neutrino experiments, such a measurement is usually performed by comparing the oscillation probabilities in the neutrino and antineutrino sectors to break degeneracies with other oscillation parameters. Such an approach has some downsides, however: for instance, the cross section for antineutrinos is significantly smaller than the one for neutrinos (˜1/3), which leads to a lower number of observed events in antineutrino mode.
It is possible, however, to measure δ even if a single channel is considered, for example, using the spectral information (i.e., studying the oscillation probability at different energies) to break the degeneracies. Moreover, in the next few years, the precision with which most of the mixing parameters will be measured will reach the sub-percent level, and those degeneracies will be less and less relevant. We will discuss the precision that can be achieved by measuring δ at accelerator neutrinos using only the neutrino sector, considering different scenarios, such as sampling the oscillation probability at different energies, or focusing on the oscillation maximum. We will also discuss how the precision on the other mixing parameters could affect the measurement and change the optimal set-up of the experiment.

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