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NOvA's $\nu_e + \nu_\mu$ oscillation analysis

NOvA is an experiment devoted to studying neutrino oscillations in the NuMI neutrino beam from FNAL (USA). It is a long-baseline experiment consisting of two functionally identical, finely granulated detectors which are separated by 810 km of Earth crust and sited at 14 mrad off the beam axis. By measuring the transition probabilities P($\nu_\mu \to \nu_e$) and P($\nu_\mu \to \nu_\mu$) NOvA is able to extract oscillation parameters: Δm^2_{32}, mixing angle θ_{23}, CP violating phase δ_{CP} and neutrino mass hierarchy.

The most recent analysis was the first to include both neutrino ($9 \cdot 10^{20}$ POT) and antineutrino ($7 \cdot 10^{20}$ POT) data, which helps to resolve the "octant θ_{23} - hierarchy - δ_{CP}" degeneracies in the oscillation probability. NOvA performed a joint analysis of ν_e appearance and ν_μ disappearance channels in both neutrino and antineutrino modes, with systematic uncertainties included as pull terms. This procedure helped to set new restrictions on the oscillation parameters.

This talk will discuss the NOvA joint $\nu_e + \nu_\mu$ analysis chain, systematic treatment, and details of the fit for oscillations.

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