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NOvA's far detector predictions and understanding key systematic uncertainties.

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NOvA continues as one of the leading long-baseline neutrino experiments, thanks to Fermilab's powerful 700 kW NuMI beam, which provides NOvA with a beam of predominantly muon neutrinos or antineutrinos. NOvA studies neutrino oscillations using two detectors, both constructed from plastic extrusions filled with liquid scintillator, placed 810 km apart and both slightly off-axis from the beam center. A key part of NOvA's approach is that we sample the NuMI beam with a near detector close to the target. This allows us to build an accurate far detector prediction and, since the detectors are functionally identical, largely cancel key flux and cross-section systematic uncertainties. The three-flavour long-baseline search probes undetermined physics parameters that describe neutrino mixing matrix, such as the mass hierarchy, CP violation in the lepton sector and the octant of θ_{23}. Although statistical uncertainties dominate in our current results, understanding key sources of systematic uncertainty and their correlations is crucial in a joint fit to selected ν_μ disappearance and ν_e appearance events, in both neutrino and antineutrino beam modes. In this talk, I will describe how we build up an accurate prediction at the far detector, using near detector data, and how we seek to understand key sources of systematic uncertainty by studying systematically shifted far detector predictions.

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