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P3.004 **Evaluating systematic constraints from proposed DUNE near detectors using VALOR**

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The current generation of neutrino experiments has demonstrated unequivocally the power of using a near detector to constrain systematic uncertainties for oscillation measurements. Several different designs are being considered for a DUNE near detector at Fermilab including a straw tracker, a high pressure gas TPC and a liquid argon TPC. We seek to evaluate the performance of the various proposed designs and thus optimise DUNE's physics potential.

We perform fits of simulated datasets for potential DUNE near detectors, using a number of event samples defined by their reconstructed final state. In the current iteration, we use nine samples each for neutrino and antineutrino beam modes including six muon-neutrino CC samples, an electron-neutrino inclusive sample, a wrong-sign CC inclusive sample and an NC inclusive sample. Simultaneous fitting of many samples allows us to break degeneracies between neutrino interaction, flux and detector uncertainties. This analysis is performed using an evolution of the flexible VALOR software used for T2K oscillation publications.

This method produces simulated constraints on the neutrino interaction and flux uncertainties, as well as their correlations. The final output of this analysis will be used as an input for oscillation sensitivity studies using the DUNE far detector, allowing evaluation of the near detector required to achieve a target-sensitivity to CP violation.