

Prospects of Light Sterile Neutrino Oscillation and CP Violation Searches at the Fermilab Short Baseline Neutrino Facility

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The Short Baseline Neutrino (SBN) program at Fermilab will be uniquely poised to probe for the existence of 3 active plus N sterile ($3+N$) neutrino oscillation models. In this poster, we present the results of a complete sensitivity analysis of the $3+N$ parameter space for $3+1$, $3+2$ and $3+3$ models with a focus on the globally allowed regions of parameter space by other short baseline experiments.

In the case of $3+2$ and $3+3$ models, CP-violating phases appear in the oscillation probability terms, leading to observable differences in appearance probabilities between neutrinos and antineutrinos. We explore SBN's sensitivity to those phases in the currently planned neutrino beam running and find that if an additional antineutrino exposure is considered, for maximal values of the $3+2$ CP-violating phases, SBN could be the first experiment to directly observe hints of CP violation associated with an extended lepton sector.

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