

Inclusive searches for eV-scale sterile neutrinos at SBND

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Since their first detection, neutrinos have offered several experimental anomalies, each leading to significant discoveries and broadening our understanding of fundamental interactions. Several such anomalies, however, remain unresolved. Those include the LSND, MiniBooNE, and Gallium anomalies, each of which can independently be interpreted as neutrino oscillations involving the addition of (at least) a fourth neutrino type with mass in the 0.1-10 eV range. The Short Baseline Neutrino Program at Fermi National Laboratory has finally been realized, employing a suite of liquid argon time projection chamber detectors at different baselines, with the operation of its final, near detector beginning in 2024. The primary goal of this program is to definitively address the aforementioned short baseline anomalies. Combined, the Short Baseline Near Detector (SBND) and its far detector counterpart, ICARUS, offer unprecedented sensitivity reach to light sterile neutrino oscillations, leveraging advances in liquid-argon time projection chamber technology and the largest neutrino dataset ever, to be collected. To reach that goal, advanced event selections need to be developed, as well as multi-detector, multi-channel high-performance fitting frameworks. This poster discusses the latest progress being made on these fronts and highlights remaining challenges.

Poster prize

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