

Performance Optimization of a Short-Baseline Neutrino Beamline at CERN

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In the framework of Physics Beyond Colliders (PBC) initiative at CERN, a concept for a short-baseline neutrino beamline is currently being studied. Particularly, the ENUBET and NuTag collaborations that previously designed different versions of short and long baseline monitored and tagged neutrino beams are now collaborating towards a common design and conceptual feasibility study. Within the scope of the Conventional Beams working group at CERN, this short-baseline design, designated “SBL Neutrino Beamline (SBL)”, provides, if approved, the unique opportunity to perform a high-precision ($O(1\%)$) measurement of the electron neutrino cross-section in the low-GeV neutrino energy range.

A key parameter for the operation and ultimately the feasibility of such a beamline is its efficiency, i.e., the optimization of the number of required protons on target to achieve the goal of a cumulative flux of 10^4 electron neutrinos in a near detector.

In this contribution, the current design for the short baseline as well as a conceptual study of an alternative long baseline is presented. In addition, a state-of-the art optimization framework is presented. The optimized design for the short baseline features significant performance improvements over the previously studied alternative.

Poster prize

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