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Increased Neutrino Yield with the new NOvA Target Design: Simulation Study

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NOvA (NuMI Off-axis ν_e Appearance) is a long baseline neutrino oscillation experiment designed to search for both ν_e appearance and ν_μ disappearance. Fermilab NuMI (Neutrinos at Main Injector) facility produces an intense neutrino beam (narrow band ν_μ beam peaked at 2 GeV in energy) colliding 120 GeV protons from the Main Injector into a long target with a set of two magnetic horns (Horn1 and Horn2) to focus the pions produced at the target. We studied different target designs and Horn2 configuration. Here, we present the New Target design which increases the ν_μ (anti- ν_μ) yield at the NOvA Near and Far detectors by about 17% (20%) compared to the event yield with the current NuMI target.

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