Abstract Submitted
for the SES12 Meeting of
The American Physical Society

A Neutron-Antineutron Oscillation Search Experiment for Fermi National Accelerator Laboratory's Project X DAVID PHILLIPS, North Carolina State University, NNBARX COLLABORATION — Neutron-antineutron oscillation experiments with free neutrons provide a sensitive search for baryon number violating interactions with $\Delta B = 2$. Observation of $n - \overline{n}$ oscillation would provide insight into the origin of baryon asymmetry in the universe and would change our ideas on the energy scales relevant for quark-lepton unification and neutrino mass generation. We present the concept for a $n - \overline{n}$ experiment at Fermilab's Project X. The first stage of such an experiment would be similar to the most precise experiment to date, performed at the Institut Laue Langevin (ILL). Improvements to the neutron reflectors and cold neutron extraction efficiency would be made in an attempt to meet the science-driven goals of more than an order of magnitude sensitivity increase over the ILL experiment and to exceed $n - \overline{n}$ oscillation limits obtained in intranuclear searches at Super-Kamiokande. A potential second stage would use a vertical configuration and lower energy neutrons to increase the sensitivity. We review the motivation and strategies for a next generation $n - \overline{n}$ oscillation experiment with an emphasis on the technologies needed to achieve the desired sensitivity.

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Date submitted: 15 Sep 2012 Electronic form version 1.4