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Search for Neutron Anti-Neutron Oscillation using Cold Neutron Beams with Focusing Optics HIROHIKO SHIMIZU, Nagoya University, NNBAR COLLABORATION — The electric charge of neutrons is experimentally known as less than 10^{-21}e and considered as exactly zero and the transition between neutron and anti-neutron is allowed in terms of the conservation of the electric charge but is considered forbidden according to the empirical conservation law of the baryon number. On the other hand, the existence of physical processes which violates the conservation of the baryon number is required in the Sakharov's conditions to explain the baryon assymmetry in the big-bang cosmology. The search for the neutron antineutron ($n\bar{n}$) oscillation offers information the baryon number violation with the $\Delta(B-L) = 2$ complementary to the attempts with $\Delta(B-L) = 0$. The sensitivity to the $n\bar{n}$ oscillation has been improved by searching for the instability of nuclei via $n\bar{n}$ oscillation in large-scale deep-underground experiments, which are now limited by the background. On the other hand, the improvement of accelerator-driven neutron sources and transport optics of slow neutron beams have introduced new possibility to improve the sensitivity to $n\bar{n}$ by orders of magnitude. In this paper, we discuss the experimental sensitivity to $n\bar{n}$ oscillation with accelerator-based neutron sources and neutron focusing optics.

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