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Computational analysis of an experimental approach to search for free neutron-antineutron oscillations based on coherent neutron and antineutron supermirror reflection KYLIE DICKERSON, MIKE SNOW, Indiana Univ - Bloomington — An observation of neutron-antineutron oscillations (n - $\bar{n}$), which violate both B and B-L conservation, would constitute a scientific discovery of fundamental importance to physics and cosmology. B violation along with CP/T violation and departure from thermal equilibrium are needed to make the baryon asymmetry according to the Sakharov argument. A stringent upper bound on its transition rate would make an important contribution to our understanding of the baryon asymmetry of the Universe by eliminating the postsphaleron baryogenesis scenario in the light quark sector. We extend the work of Nesvizhevsky [Phys. Rev. Lett. 122, 221802 (2019). arXiv: 1810.04988.] and present a quantitative analysis of a means to probe this oscillation time via the use of $n/\bar{n}$ supermirrors. Selecting materials with a large contrast in the neutron scattering length density and a continuous distribution of thicknesses minimizes, for sufficiently small transverse momenta of $n/\bar{n}$, the relative phase shift of the n and $\bar{n}$ components upon reflection, allowing for sufficient coherence to benefit from the greater phase space acceptance the supermirror provides.

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