

Abstract Submitted
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Neutron-Antineutron Oscillation and Annihilation on C-12 at the European Spallation Source¹ CHARLES LADD, YURI KAMYSHKOV, BEN RYBOLT, JOSHUA BARROW, The University of Tennessee, ELENA GOLUBEVA, The Institute for Nuclear Research, Moscow, THE EUROPEAN SPALLATION SOURCE COLLABORATION — In the Standard Model, baryon and lepton number (B, L) are conserved. However, Sakharov showed that in the early universe violation of B was a requirement to explain the matter-antimatter asymmetry. One type of B violation being focused on at the ESS is that of neutron-antineutron oscillation ($n-\bar{n}$), a $\Delta B = 2$ process, thus showing that baryon number is not conserved. The ESS aims to search for $n-\bar{n}$ at a soon to be constructed, high-intensity neutron beamline. There, if $n-\bar{n}$ occurs, the neutron will travel down the beamline, oscillate into an antineutron, and hit a target of carbon nanofoil; this is similar to a previous search at the ILL in Grenoble. On this nanofoil, annihilation to mesons would occur with individual carbon nuclei, those mesons being collected on a high-resolution detector. Currently, MC data generation and analysis is underway for the ESS collaboration with the aid of E. Golubeva, hoping to properly model the appropriate nuclear interactions. For purposes of validation and verification, this work provides a detailed overview of antinucleon-nucleon annihilation properties. It is important to study such generated data in order to make more definite predictions of the efficiency for the detection of $n-\bar{n}$.

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