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The HIBEAM/NNBAR Experiment for the European Spallation Source

The HIBEAM/NNBAR experiment is a two stage experiment for the European Spallation Source (ESS) to search for baryon number violation. The experiment would make high sensitivity searches for baryon number violating processes: $n \rightarrow n\bar{b}$ (neutron to antineutron) and $n \rightarrow n'$ (neutron to sterile neutron), corresponding to the selection rules in baryon number $\Delta B = 2, 1$, respectively. The experiment addresses topical open questions such as baryogenesis and dark matter, and is sensitive to a scale of new physics substantially in excess of that available at colliders. This is a cross disciplinary experiment with a clear particle physics goal. The community encompasses physicists from large collider experiments and low energy nuclear physics experiments, together with scientists specialising in neutronics and magnetics. European, US and Asian communities are represented. The experiment would increase the sensitivity to neutron conversion probabilities by three orders of magnitude compared with previous searches. The opportunity to make such a leap in sensitivity in tests of a global symmetry is rare and should not be missed.

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