

A new program of searches for baryon number violation via neutron conversions at ORNL and the ESS

Tuesday 28 July 2020 17:30 (15 minutes)

Searches for free neutrons converting to anti-neutrons ($|\Delta B|=2$) and/or sterile neutrons ($|\Delta B|=1$) play a distinctive and complementary role in the worldwide program of baryon number violation searches. These searches provide an important test of a global symmetry that must be violated to create a baryon asymmetry in the universe, and offer a unique portal to a dark sector through these feeble interactions. An international collaboration has developed a staged program of searches for neutron conversions at Oak Ridge National Laboratory and the European Spallation Source, which will allow both precision searches and research and development for subsequent stages, culminating in an ultimate improvement in sensitivity of around three orders of magnitude compared with earlier work. We will outline this program and present results of the first-stage search for neutron conversions to sterile neutrons in large magnetic fields, suggested to explain the long-standing neutron lifetime anomaly.

Secondary track (number)

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Session Classification: Beyond the Standard Model

Track Classification: 03. Beyond the Standard Model