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The UCN facility at TRIUMF

Wednesday, 18 October 2017 15:00 (45 minutes)

The newly installed vertical source at TRIUMF will enable the production of neutrons with energies below 300~neV, referred to as ultracold neutrons (UCN). A superfluid helium cryostat uses three cooling stages and a heat exchanger to produce isopure He-II at <1K. Fast neutrons are produced through spallation of a tungsten target by a proton beam from the TRIUMF 520~MeV cyclotron. These neutrons are cooled down through a series of moderators: first to 300~K in liquid D2O, then to < 80~K in ice D2O, and finally to the ultracold regime in the He-II bulk within the cryostat. Neutrons in this temperature range can be confined by strong interactions with high Fermi potential materials, allowing them to be directed and stored. The ability to confine UCN makes them useful for exploring fundamental neutron physics. In particular, the UCN produced at TRIUMF will be used to probe the upper limit of the neutron electric dipole moment (nEDM), currently bound as $|d_n| < 3\times10^{-26} e$cm. The existence of the nEDM is a violation of CP-symmetry, and the magnitude of the nEDM provides insight into CP violating processes.

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