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The neutron lifetime

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The free neutron decays to a proton, electron, and antineutrino with a lifetime of about 15 minutes. Neutron decay is the prototype for nuclear beta decay and other semileptonic weak decays. The value of the neutron lifetime, along with neutron decay correlation parameters, provides direct access to the vector and axial vector weak couplings of the nucleon and the CKM matrix element V_{ud} and can search for hints of new physics beyond the Standard Model. The neutron lifetime is a key ingredient in theoretical calculations of primordial element abundances from Big Bang nucleosynthesis. Two main methods, the beam method and the ultracold neutron bottle method, have approached the 10^{-3} precision level in recent years, but unfortunately these two methods currently disagree by more than 8 seconds (almost 4 standard deviations). I will discuss the motivation and physics of the neutron lifetime and briefly review past experiments and future plans.

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