



Irfu

Institut de recherche
sur les lois fondamentales
de l'Univers

**Séminaire
DPhP**

Lundi 21/03/2022, 15h00

attention, horaire inhabituel!

Zoom (Online)

Precision measurements of neutron beta decay

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When not bound up in an atomic nucleus, the neutron decays into a proton, electron and anti-neutrino in on average about 15 minutes. Detailed measurements of this process – the overall rate, correlations between neutron spin and final-state particle momenta, etc. – can be used to determine parameters of the underlying standard model of particle physics. The problem is overconstrained: there are many possible experimental observables dependent on just a few standard model parameters. The parameters thus determined can be compared with results of other experiments to test the fundamental theory, possibly revealing new physics as experimental precision improves. An experiment at LANL, using ultracold neutrons produced at the LANSCE accelerator, recently produced a world-leading measurement of the neutron lifetime, with overall uncertainty half that of the previous best measurements. This precision begins to probe an apparent discrepancy in the fundamental theory that has arisen in a class of nuclear beta decay measurements. In this talk, I will discuss neutron beta decay experiments, especially neutron lifetime measurements including the "UCNtau" effort at Los Alamos National Laboratory, and prospects for extending the reach of these experiments for more stringent tests of the standard model.