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Precise Measurements of the Decay of Free Neutrons

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We review the impact of new and highly precise neutron beta decay data with a focus on recent results from neutron lifetime, beta asymmetry, and electron-neutrino correlation experiments. From these results, we extract weak interaction parameters with unprecedented precision. This is enabled also by progress in effective field theory and lattice quantum chromodynamics. Limits on New Physics beyond the Standard Model of particle physics derived from neutron decay data are sharper than the corresponding limits derived from high-energy experiments. Recent experimental results allow an extraction of the element V_{ud} of the Cabibbo-Kobayashi-Maskawa matrix with very competitive precision to superallowed nuclear beta decays and confirm the currently prominent Cabibbo-angle anomaly.

We discuss the prospects and impact of the upcoming neutron beta decay experiment PERC at the MLZ, and present its status.

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