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Neutron beta decay with pulsed cold neutron beams

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The instrument PERKEO III was used to measure most precisely the beta asymmetry in neutron decay at the cold neutron beam line PF1b of the ILL, Grenoble. From this measurement, we extract the ratio of nucleon axial-vector and vector couplings. When combined with the neutron lifetime, this provides the CKM matrix element V_{ud} with only a factor two in precision to the combined result from superallowed nuclear decays. PERKEO's successor, the PERC instrument, is currently being commissioned at the FRM II, Garching, which aims at an improved measurement of the beta asymmetry by a factor of five. Pulsed neutron beams are key to systematic control in both experiments.

A combined analysis of the beta-asymmetry and the Fierz interference term provides the currently most precise and systematically clean limit from neutron decay. Just before recent lock-downs, the PERKEO III group completed a successful campaign at the ILL to measure the beta spectrum with the aim improve these limits.

In this talk, I will discuss recent results by the PERKEO III collaboration and present the status of its successor PERC.

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