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The backscatter detector system of PERC

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The PERC facility is currently under construction at the FRM II. It aims to measure the beta spectrum of neutron decay more precisely than its predecessors PERKEO II and PERKEO III, enabling the determination of several correlation coefficients in neutron decay with an improved precision by one order of magnitude. Of particular interest is the so-called beta asymmetry parameter A . PERC aims to measure A with an unprecedented precision of $A = 5 \times 10^{-5}$ making it possible to determine the CKM matrix element V_{ud} most precisely and test the unitarity of the CKM matrix.

PERC will observe neutron decay in an 8 m long neutron guide and a high magnetic field will guide the charged decay products downstream to the main detector. To achieve the targeted precision, we have to identify backscattering events, in which the electron only deposits a part of its energy in the detector, as this would otherwise alter the spectrum. The magnetic field guides backscattered electrons downstream, where a detector system will identify these events by the coincidence time. The backscatter detectors will consist of two scintillation detectors and SiPM arrays on the backside for readout. Due to the high background in that area, spatial resolution is necessary to avoid accidental coincidences. Using the simulation tool Geant4 I compare different possible setups in their energy and spatial resolution. I present the results of these simulations and the status of the development of the detectors.

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