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Research of silicon strip sensor specification and evaluation for the muon g-2/EDM experiment at J-PARC

The muon's anomalous magnetic moment (g-2) was measured with 0.54ppm accuracy. There is 3.3 sigma discrepancy between the SM prediction and measured value. Muon's electric dipole moment (EDM) limit is 10ˆ-19 e□cm. The muon g-2/EDM at J-PARC (E34), aims to reach a sensitivity of 0.1 ppm, and try to measure EDM down to 10ˆ-21 e□cm sensitivity.

In this experiment, we accelerate muon to the 300 MeV/c, storage in the 3 T precise magnetic fields and reconstruct a track of muon decay positron by highly-segmented positron tracking detector. We use silicon strip sensor for the tracker because the tracker requires high rate capability, high stability against a large rate change, good operation in a high magnetic field, and good position resolution. The sensor specification is optimized by considering rate capability, and the sensor misalignment involves EDM sensitivity. We optimized sensor specification and estimated the requirement of accuracy of the alignment by using the simulation. Based on the specifications, we produced two types new test sensors. We evaluated the performance of test sensor, and estimated signal to noise ratio.

We will present results of specification, estimation of the requirements for the sensor alignment, and test sensors evaluation.

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