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Generation of a cooled muon beam for the J-PARC muon g-2/EDM experiment

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The J-PARC muon g-2/EDM experiment aims to measure the muon magnetic moment anomaly (a_μ = (g-2)/2) and to search for the muon electric dipole moment (EDM), with sensitivity comparable to the highest in the world. This will be achieved using a small-emittance muon beam, created by cooling muons to thermal energy at room temperature and accelerating them with a four-stage linac. The small emittance can eliminate the strong focusing requirements for muon storage and the beam-momentum constraint associated with the focusing, both adopted in the previous measurements conducted in BNL E821 and Fermilab E989. As a result, the J-PARC measurement has the experimental approach significantly different from that of the previous measurements, and will enhance our experimental understanding of a_μ and its deviation from theoretical predictions. The experiment, planned to begin commissioning in JFY2030, is currently progressing with the development and implementation of experimental instruments and facility construction. Notably, the first-stage acceleration of cooled muons, up to the kinetic energy of 100 keV, was successfully demonstrated at J-PARC in JFY2024. The obtained transverse emittance indicates more than two orders of magnitude reduction from that of muons before cooling. This talk will present the current status and future prospects of the experiment focusing on the development of the small-emittance muon beam.

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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