Development of a DC-to-DC converter for the J-PARC muon g-2/EDM experiment

S. Lee[1#], J. Choi[1], W. Lee[1], T. Mibe[2], N. Saito[2], K. Sasaki[2], and E. Won[1]
for the J-PARC muon g-2/EDM (E34) collaboration

[1]*Department of Physics, Korea University, Seoul 136-713, Korea*
[2]*Institute of Particle and Nuclear Studies, KEK, Tsukuba, Ibaraki 305-0801, Japan*

 # a corresponding author: shlee@hep.korea.ac.kr

The J-PARC muon g-2/EDM experiment [1] is a new experiment to measure the anomalous magnetic moment (g-2) and electric dipole moment (EDM) of muon at J-PARC. The experiment is planned to start in 2016, and targets a sensitivity of 0.1 parts per million (ppm).

In the muon storage ring, it is required to convert a high direct current (DC) voltage to a certain level (~1.5 V) of DC voltage to provide bias voltage to readout electronics. For the purpose, we are developing a step-down DC-to-DC converter utilizing a Buck converter [2].

To measure momenta of particles produced in the experiment, the detector components including the storage ring are under a 3 T magnet field. Since the converter contains an inductor that produces an additional magnetic field, the field has to be minimal not to corrupt the global magnetic field ($B < 30$ μT). In addition to the magnetic field, the experiment is quite sensitive to the electric field in the storage ring; therefore, the electric field produced by the converter has to be minimal as well ($E << 1$ V/m).

In this poster, we present the development status of the DC-to-DC converter for the J-PARC muon g-2/EDM experiment.

References

[1] M. Aoki *et al.*, "Conceptual Design Report for The Measurement of the Muon Anomalous Magnetic Moment g-2 and Electric Dipole Moment at J-PARC" (2011).
[2] P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press (1989).