
Contribution ID: **475** Contribution code: **TUE-PO1-104-01** Type: **Poster**

# Control of Rotatable-Quadrupole Magnets Angles for 3-D Spiral Injection Test Experiment

*Tuesday, 16 November 2021 13:15 (20 minutes)*

The muon g-2/EDM experiment, which aims at the ultra-precise measurement of muon anomalous magnetic moment (g-2) and electric dipole moment (EDM), is now under planning at J-PARC. For muon g-2, there is a discrepancy of more than 3-σ between the theoretical calculation in the Standard Model and the experimental results in the preceding experiment. Therefore, muon g-2 is one of the promising physics quantities to search for new physics beyond the Standard Model by ultra-precise measurements. Also, the EDM measurements of muons may be the first experimental detection of the time reversal symmetry breaking.
To realize these ultra-precise measurements, muon beams will be injected and stored in a solenoid-type magnet with a diameter of 66 cm, which is based on a medical MRI magnet. At this time, an unprecedented beam injection method called 3-D spiral injection is adopted, and the demonstration experiment is being carried out at KEK.
For successful 3D spiral injection of the beam, correlation of phase spaces of horizontal and vertical directions (so-called "X-Y coupling") should be controlled appropriately. This X-Y coupling can be adjusted by the rotation angles and current values of quadrupole magnets in the beamline. To precisely adjust this rotation angles and ensure the reproducibility of the experiment, we are planning to use remote mechanical control device.
In this presentation, we will estimate expected beam phase space controlled by ideal rotating quadrupoles, and we will compare with measured values in our beam line. Required accuracy for the rotation angle will be determined. Status of the design and fabrication of the rotation mechanism will be reported, too. In addition, dedicated pole shape study of the bending magnet is also discussed to avoid strong horizontal focusing effect on the beam. This study will allow as to accomplish very precise control of the X-Y coupling.

**Primary author:** HIRAYAMA, Honoka (Ibaraki University)

**Co-authors:** IINUMA, Hiromi (Japan/Ibaraki-University); REHMAN, Muhammad Abdul (High Energy Accelerator Research Organization (JP)); Mr OHSAWA, Satoshi (KEK); Mr NAKAYAMA, Hisayoshi (KEK); FURUKAWA, Kazuro (KEK); MIBE, Tsutomu (KEK)

**Presenter:** HIRAYAMA, Honoka (Ibaraki University)

**Session Classification:** TUE-PO1-104 Accelerator Magnets II: fast cycling, injection, extraction