In 2012, the intense beam of highly charged uranium ions was extracted from RIKEN 28GHz SC-ECRIS. Following this success, an intense beam of U$^{35+}$ ions was used for the radio isotope beam factory (RIBF) experiment for a long period. It is obvious that production of high quality beams is crucial issue for the RIKEN RIBF project. For this reason, since 2014, we systematically measured the emittance and beam intensity of highly charged uranium ions under various conditions. Furthermore, in 2015, we measured the full four-dimensional transverse phase-space distribution of highly charged U ion beam including correlations between the horizontal and vertical planes for the beam axis.

In these experiments, we observed that the emittance of the highly charged U ions are strongly affected by the aberration of the analyzing magnet in a certain condition. The effect of the aberration was reduced by decreasing the beam size in the analyzing magnet, which can be controlled by the focusing element (solenoid coil) placed between ion source and analyzing magnet.

It is well-known that the simple model calculation indicates that the emittance size increases with increasing the magnetic field. However, we observed that the emittance size of U$^{35+}$ ions for lower $B_{\text{ext}}$ and very asymmetric magnetic field distribution ($B_{\text{ext}}\sim1.45\text{T}, B_{\text{inj}}\sim3\text{T}$) was larger than that for higher $B_{\text{ext}}$ and relatively symmetric magnetic field distribution ($B_{\text{ext}}\sim1.8\text{T}, B_{\text{inj}}\sim3\text{T}$), even when the effect of the aberration was removed.

In this contribution, we present the experimental results and procedure of data analysis in detail. We also discuss about the mechanism of emittance growth described above.