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Development of ion beam analyzing system for KBSI heavy-ion accelerator

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The Korea Basic Science Institute (KBSI) has been developing a heavy ion accelerator system to produce high current, multi-charge state ions employing a 28 GHz superconducting electron cyclotron ion source. An analyzing system as a part of the LEBT apparatus was developed to separate the ion beams. The desired species of ion beam, which was generated and extracted from the ECR ion source including various particles, could be selected by 90 degree dipole electromagnet. Two dimensional electromagnetic design of the dipole magnet was firstly performed for searching basic parameters to meet the requirement of LEBT design. Due to the non-symmetric structure in the coil as well as non-linear permeability of yoke material coil, three dimensional analysis was carried out to confirm the design parameters. Power supply for analyzing magnet was also developed to satisfy the high precision control (~10 ppm), which is enable to separate various species ion beam. After the fabrication and installation, we observed the performance of analyzing system through the 3-axis field measurement. In this paper, we present the operational results of analyzing system for KBSI accelerator. The effectiveness of beam selection is confirmed during the test of analyzing system by injecting ion beam from ECR ion source.