

Development of Cryostat with Radiation Shielding for 28 GHz Superconducting Electron Cyclotron Resonance Ion Source

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The BIBA (Busan Ion Beam Accelerator) is a compact linear accelerator facility using the 28 GHz SC-ECRIS (Superconducting Electron Cyclotron Resonance Ion Source) at the KBSI (Korea Basic Science Institute). The SC-ECRIS is designed to operate at 28 GHz with up to 10 kW of microwave power. During the operation of the SC-ECRIS, a large amount of X-rays is produced due to the high-energy electrons confined within the plasma. The emitted X-rays are absorbed by the cold mass of the superconducting magnet, leading to additional heat load on the cryostat system of SC-ECRIS. Therefore, the development of radiation shielding is essential to prevent a degradation in cryostat performance. In this paper, the effects of various radiation shielding materials under different conditions were compared and analyzed through simulations to evaluate their performance. Furthermore, X-ray spectra were measured using a Cd-Zn-Te detector combined with a collimator to analyze the X-ray emission during the operation of a 28 GHz SC-ECRIS. As a result, the cryostat with radiation shielding was fabricated, and it was confirmed that the radiation shielding performance is sufficient to ensure stable operation of the cryostat system.

Paper submission Plan

Best Presentation

Contribution track

ICABU WG1. Accelerator Systems

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