



Contribution ID: 2678 Contribution code: THPL001

Type: **Poster Presentation**

## Design study of rebuncher system for KoBRA at RAON

*Thursday, 11 May 2023 16:30 (2 hours)*

KoBRA (Korea Broad acceptance Recoil spectrometer and Apparatus) of RAON (Rare Isotope Accelerator complex for ON-line experiments) in Korea is preparing for producing rare isotopes with stable ion beams from SCL3(Superconducting Linac 3) at an energy range of 5 - 25 MeV/u in early-phase experiments. Due to quite a lengthy transport beamline from the end of SCL3 to the target of KoBRA (SCL3-KoBRA beamline), the required bunch length of incoming ion beams for KoBRA production target wouldn't be satisfactory, if the ion beam energy is less than 15 MeV/u. Therefore, this suggested a rebuncher system for longitudinal focusing within the SCL3-KoBRA beamline is absolutely needed.

In order to suppress the bunch length, the velocity bunching technique will be used, and to have the lowest possible RF power, we compared various RF cavities, such as QWR, HWR, and IH-DTL. We simulated the electric field and shunt impedance of RF cavities with CST STUDIO to estimate the effective voltage of RF cavities with different types, design  $\beta$ values, and the number of RF gaps for beam energy range of interest. Because one rebuncher cannot cover the entire beam energy range of less than 15 MeV/u, we selected normal conducting 5-gaps IH-DTL (Interdigital H-mode Drift Tube Linac) as a rebuncher for 5 - 15 MeV/u beams. Moreover, another rebuncher for less than 5 MeV/u beam is planned. This report presents the design study of the rebuncher system for KoBRA focusing on the selection process.

### Funding Agency

### Footnotes

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Yes

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**Session Classification:** Thursday Poster Session

**Track Classification:** MC6: Beam Instrumentation, Controls, Feedback and Operational Aspects:  
MC6.A12: FFA