

BUNCH COMPRESSION IN A RING IN FUTURE RIKEN PROJECTS

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Facilities of a heavy ion accelerator system, which are primarily for nuclear physics researches associated with a radio isotope beam, are constructed at RIKEN. Although the site facilities including buildings are presently under construction, studies for generating high-current heavy-ion beam and for High Energy Density Physics applications are planned as part of the MUSES project [1]. Parts of TARN2 ring [2] are being moved to RIKEN, and may be possible to rebuild as the bunch accumulation ring for these applications. The rebuilt TARN2 ring is filled from new superconducting ring cyclotrons, and beam cooling is carried out after the accumulation. The filled bunches are merged into a single superbunch by longitudinal compression. For such bunch compression, fast rotation of the longitudinal phase-space using rf or induction technology is carried out [3]. The bunch is compressed longitudinally, and is kicked out of the ring near peak compression into an extraction line for the final transport and focusing onto a target. While the fast compression scheme in the ring requires the control of space-charge and dispersive effects to achieve maximum performance at the target, the rms emittance will be increased due to these effects. We employ theory and more detailed particle-in-cell (PIC) simulations to investigate potential parameters in the system. The PIC simulations are carried out using the WARP code [3] developed to study strong space-charge effects in Heavy Ion Inertial Fusion.

- 1 T. Katayama, Heavy Ion Inertial Fusion Experiments Planned at MUSES Project at RIKEN, Fusion Engineering and Design, **44** (1999) 313-317.
- 2 T. Katayama, Beam Experiments at Cooler Synchrotron TARN II, Particle Accelerators, **37-38** (1992) 289-299.
- 3 S. M. Lund, O. Boine-Frankenheim, G. Franchetti, I. Hofmann, P. Spliller, Simulations of Axial Bunch Compression in Heavy Ion Rings for Plasma Physics Applications at GSI, Proceedings of the 1999 Particle Accelerator Conference, New York (IEEE, Piscataway, NJ. 1999) 1785-1787.