Contribution ID: **1150** Contribution code: **WEPM028** Type: **Poster Presentation**

Beam instability suppression during debunching process through slippage factor tuning in the J-PARC Main Ring

Wednesday 4 June 2025 16:00 (2 hours)

The J-PARC Main Ring achieves a high extraction efficiency of 99.5% during 30 GeV slow extraction at the current beam power of 80 kW. However, at beam powers above 30 kW, we observed ring-wide beam losses due to transverse beam instability associated with vacuum pressure rises and electron cloud effects, which are believed to be triggered by longitudinal microwave structures. To achieve stable operation at 80 kW, we implemented phase offset injection into RF buckets and two-step RF voltage reduction during debunching. For planned higher-power operations, we propose tuning the slippage factor to suppress the microwave structures during debunching. The Main Ring features a unique imaginary transition gamma lattice, and we discovered that the slippage factor can be adjusted using appropriate combinations of four quadrupole families in the arc sections while maintaining the operating tune and achromatic conditions in the long straight sections. Such slippage manipulation would be impossible in a ring with a conventional FODO lattice. The slippage factor can be ramped from its nominal value to a suppressing value during acceleration.

Footnotes

Paper preparation format

LaTeX

Region represented

Asia

Funding Agency

Author: TOMIZAWA, Masahito (High Energy Accelerator Research Organization)

Co-authors: TAMURA, Fumihiko (Japan Atomic Energy Agency); SEIYA, Kiyomi (High Energy Accelerator Research Organization); MUTO, Ryotaro (High Energy Accelerator Research Organization); ASAMI, Takashi (Japan Proton Accelerator Research Complex); SHIMOGAWA, Tetsushi (High Energy Accelerator Research Organization); SUGIYAMA, Yasuyuki (High Energy Accelerator Research Organization); MORITA, Yuichi (High Energy Accelerator Research Organization)

Presenter: TOMIZAWA, Masahito (High Energy Accelerator Research Organization)

Session Classification: Wednesday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D01 Beam Optics Lattices, Correction Schemes, Transport