

TUP22

A Simulation Study on Chopper Transient Effects in J-PARC Linac

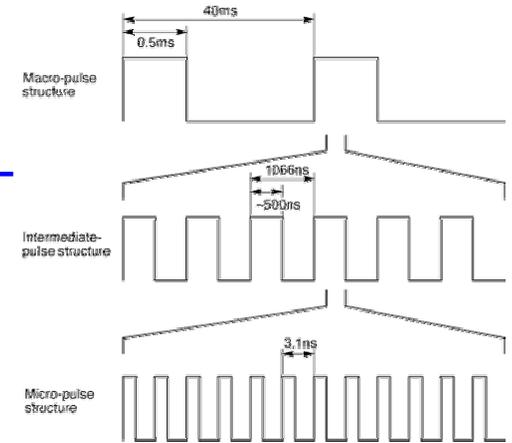
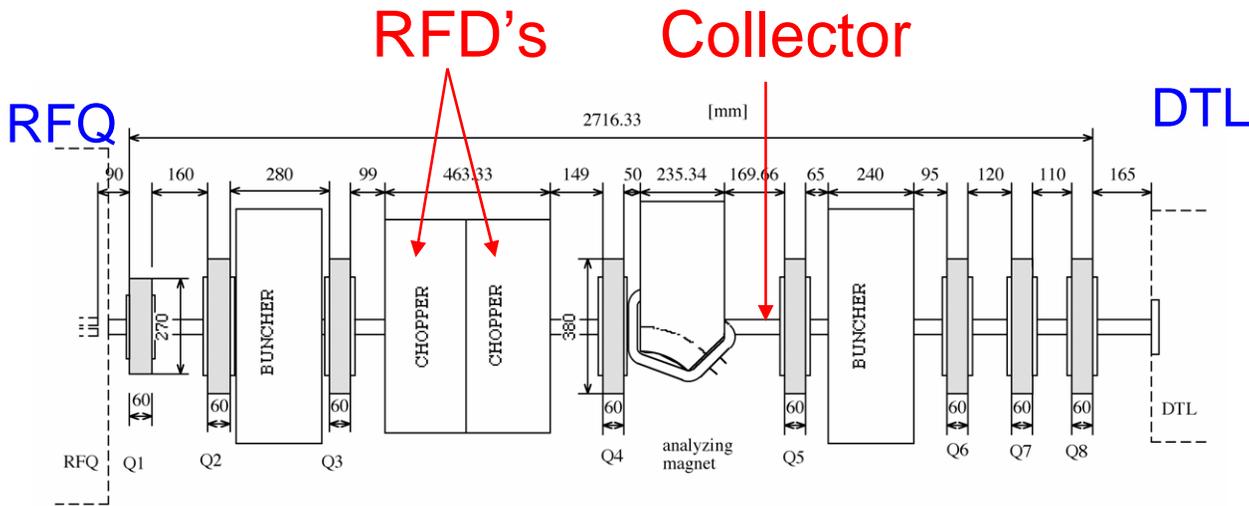


LINAC2004

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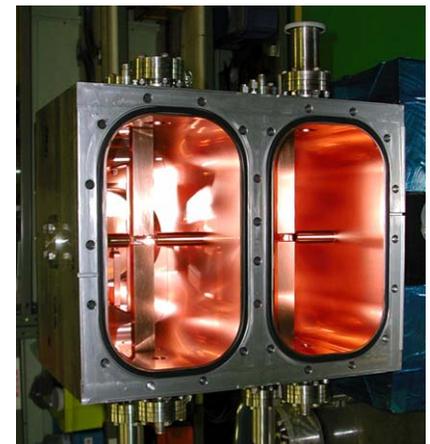
J-PARC linac MEBT chopper



Linac pulse structure

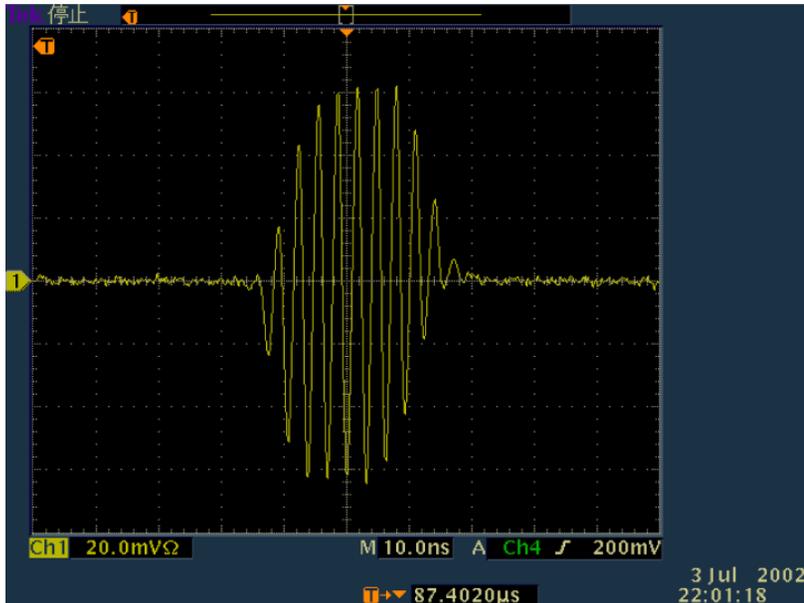
In MEBT, beams are horizontally deflected by two RFD (RF deflection) cavities.

Deflected beams are collected with a collector in MEBT.



RF deflection cavity

Experimental results



BPM signal for chopped beam. 10 ns/div.

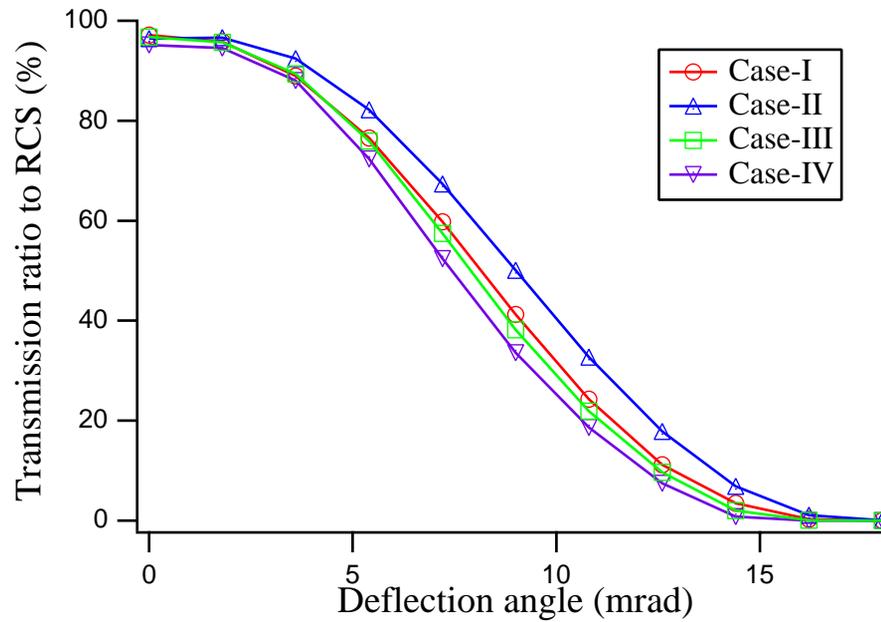
- In MEBT beam tests in 2002, the rise- and fall-times of RFD cavities are found to be ~ 10nsec.
- ~ 3 micro-bunches are half-kicked by RFD in rising- and falling-times, which can result in the excess beam loss and the excess radiation load to the L3BT halo collimator system.

Simulation study



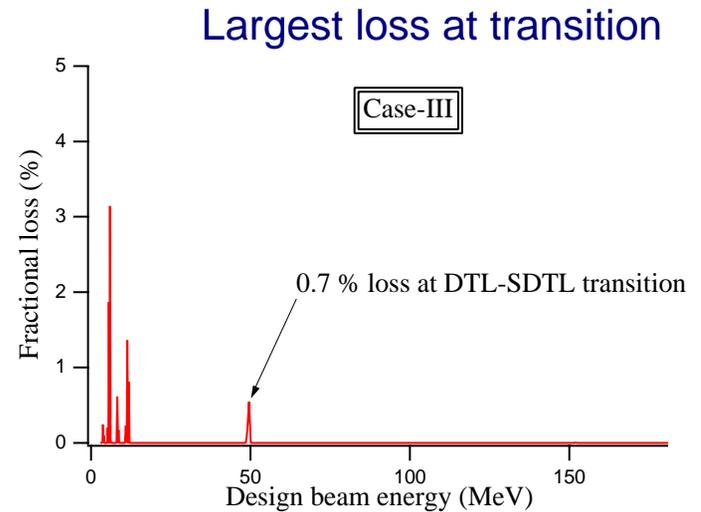
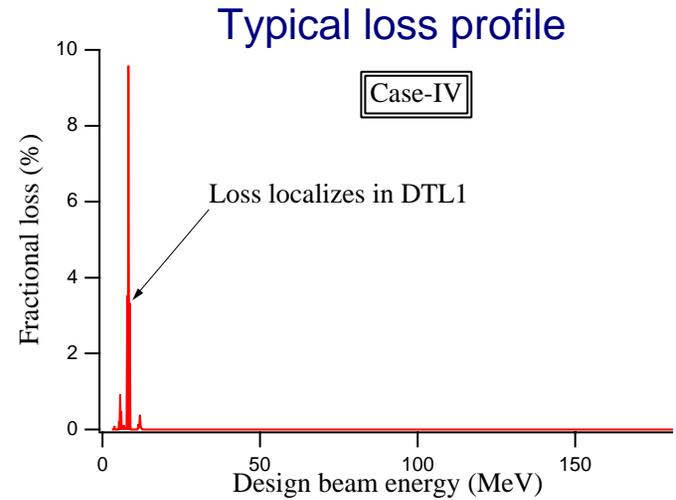
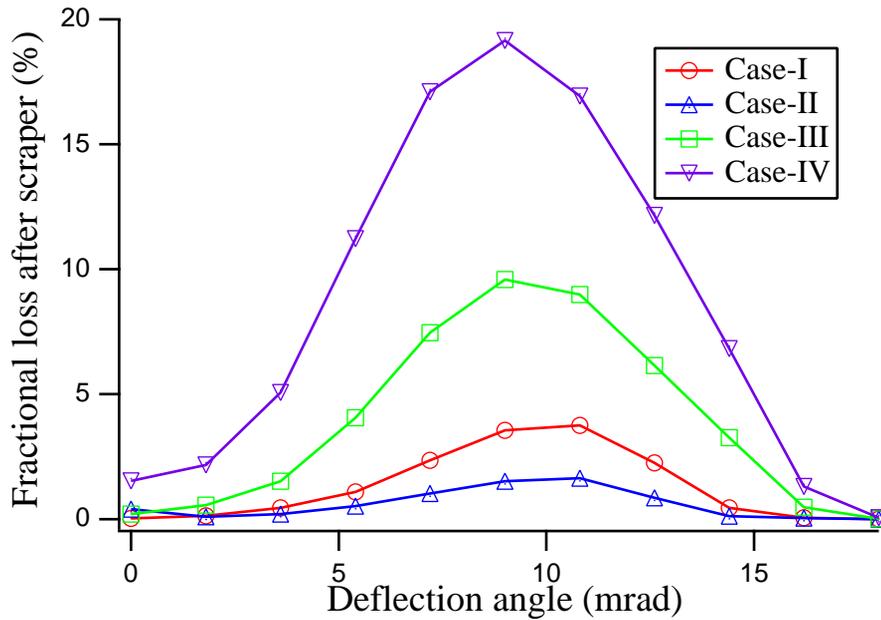
- What is the fate of half-kicked beams?
 - How large excess beam loss?
 - How large excess transverse emittance growth?
- To address these questions, 3D particle simulations have been performed.

Transmission ratio



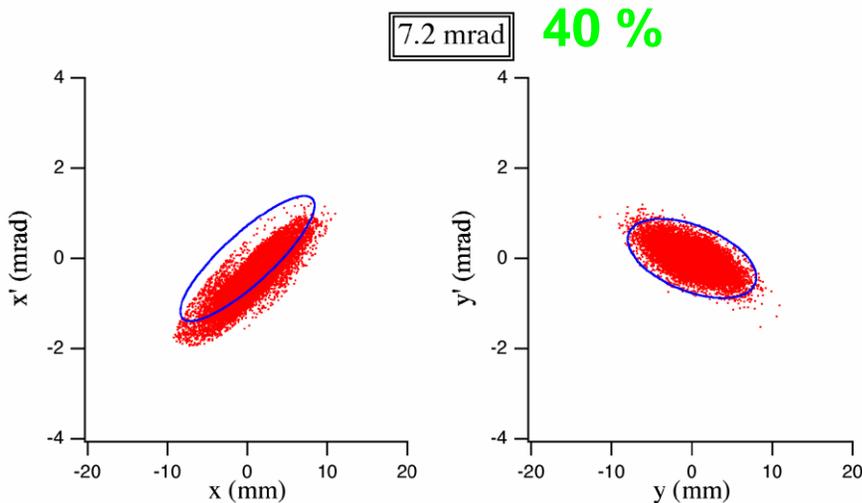
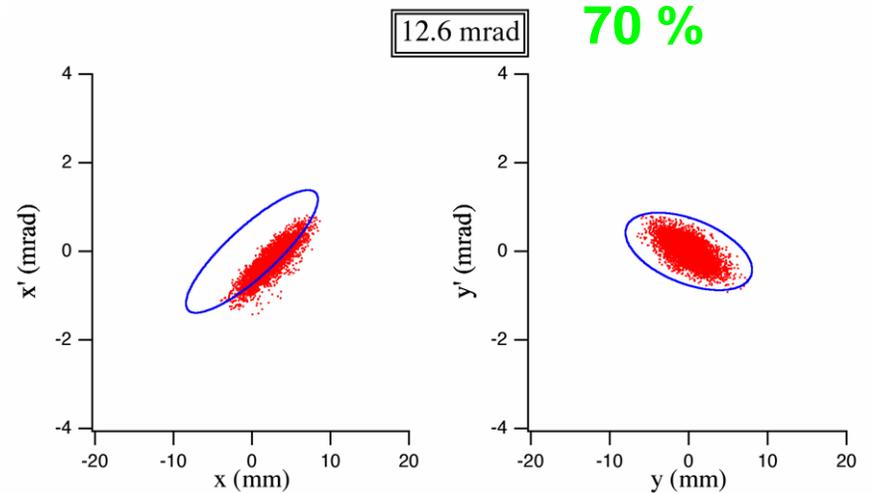
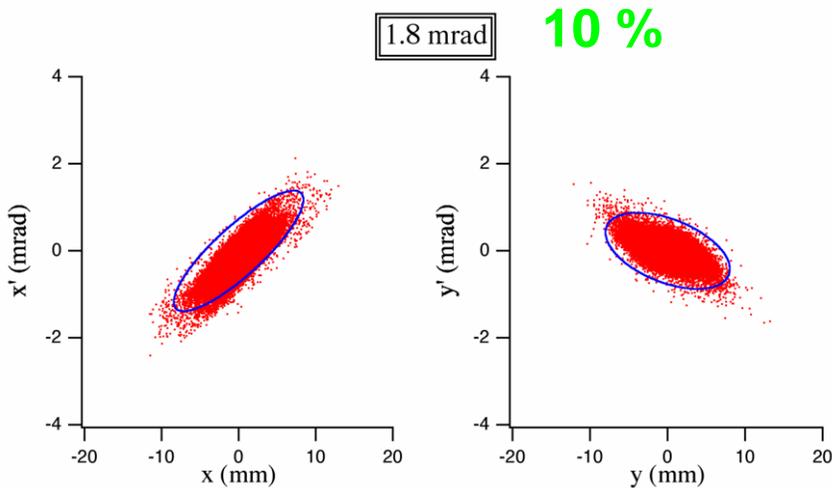
Ratio of number of particles at RCS injection to that at MEBT entrance.

Downstream loss



9 mrad deflection for both figures.

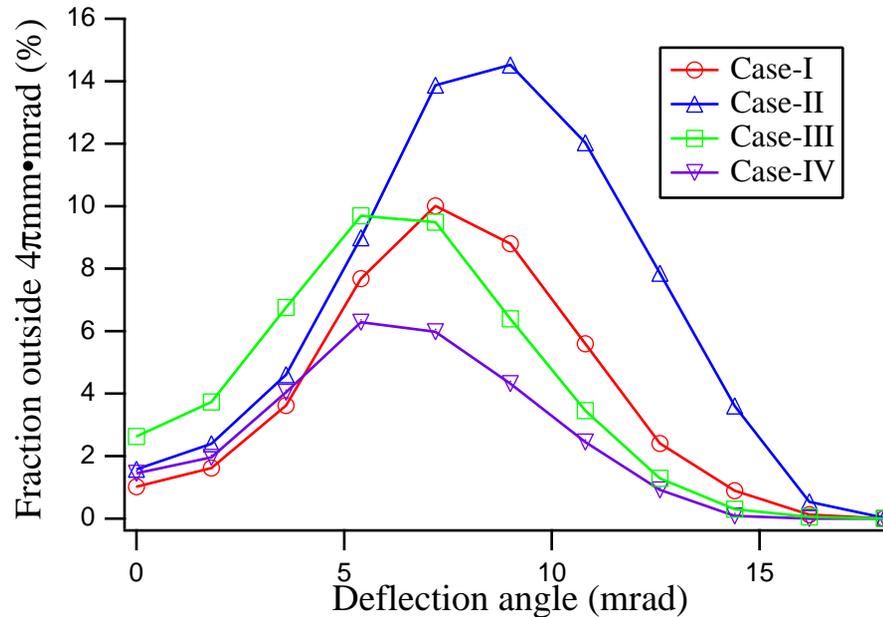
Phase space distribution



Phase-space distribution for Case-I.

Blue ellipses are 4π boundary for un-deflected beam

Halo collimator load



We count the number of particles which locate outside the 4π ellipse boundary.

Then, take the ratio of that number to the number of particles at MEBT entrance.

Related presentations

■ Oral presentation

- **TH101**: Y. Yamazaki, “**Status of the J-PARC Linac, Initial Results and Upgrade Plan**”.

■ Poster presentation

- **MOP19**: Y. Kondo et.al., “**Particle Distributions at the Exit of the J-PARC RFQ**”.
- **TUP06**: F. Naito et.al., “**Results of the High-Power Conditioning and the First Beam Acceleration of the DTL-1 for J-PARC**”.
- **TUP21**: M. Ikegami et.al., “**Beam Dynamics Design of J-PARC Linac High-Energy Section**”.
- **TUP23**: M. Ikegami et. al., “**A Simulation Study on Error Effects in J-PARC Linac**”.
- **TUP65**: M. Ikegami et. al., “**RF Tuning Schemes for J-PARC DTL & SDTL**”.
- **TUP66**: M. Ikegami et. al., “**An Alternative Tuning Scheme for J-PARC SDTL Tuning**”.
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