



[MoB3-5]

NUMERICAL STUDY FOR ELECTRON BEAM DYNAMICS INCOMPACT SIMULATOR FOR HEAVY ION INERTIAL FUSION

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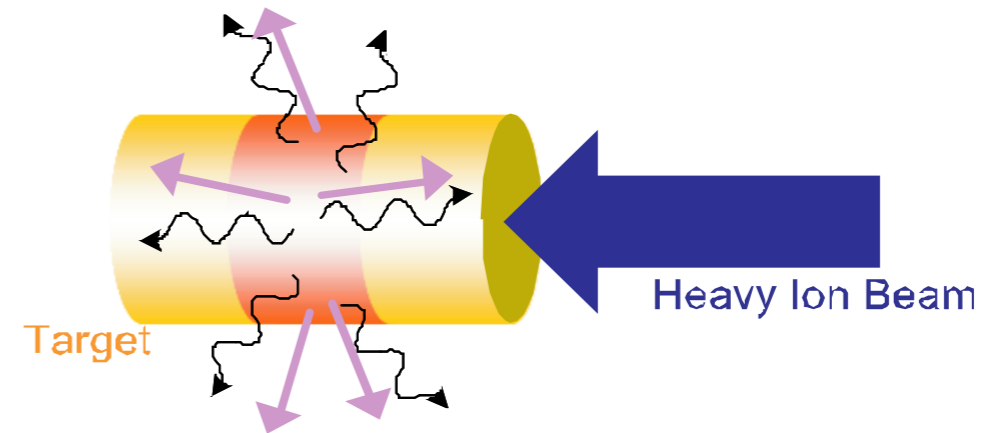
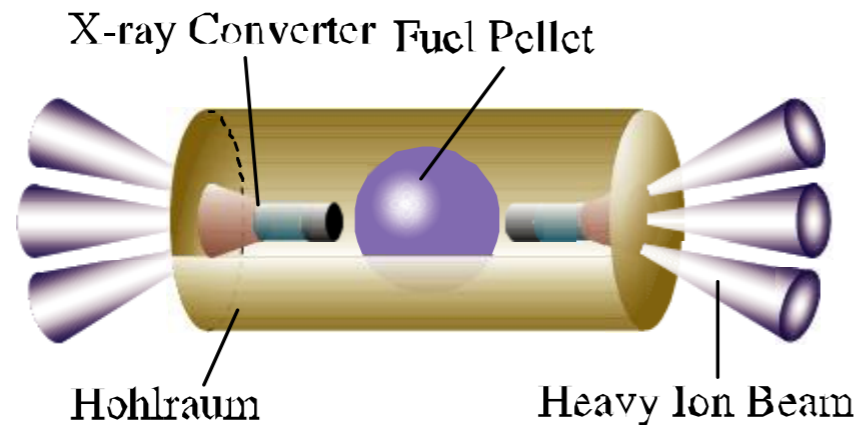
*Tokyo Institute of Technology



EAPPC-BEAMS 2010, October 11,
2010 (Monday), ICC Jeju, Jeju, Korea

Particle Beam for HIF & HEDP, WDM Applications

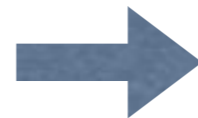
For HIF & Ion Beam Driven HEDP, WDM researches



➔ HED Plasma Generation by High Power Beam Illumination

$$\text{Power} = \text{Kinetic Energy} \times \text{Beam Current}$$

High Energy Particle



Broad Energy Deposition

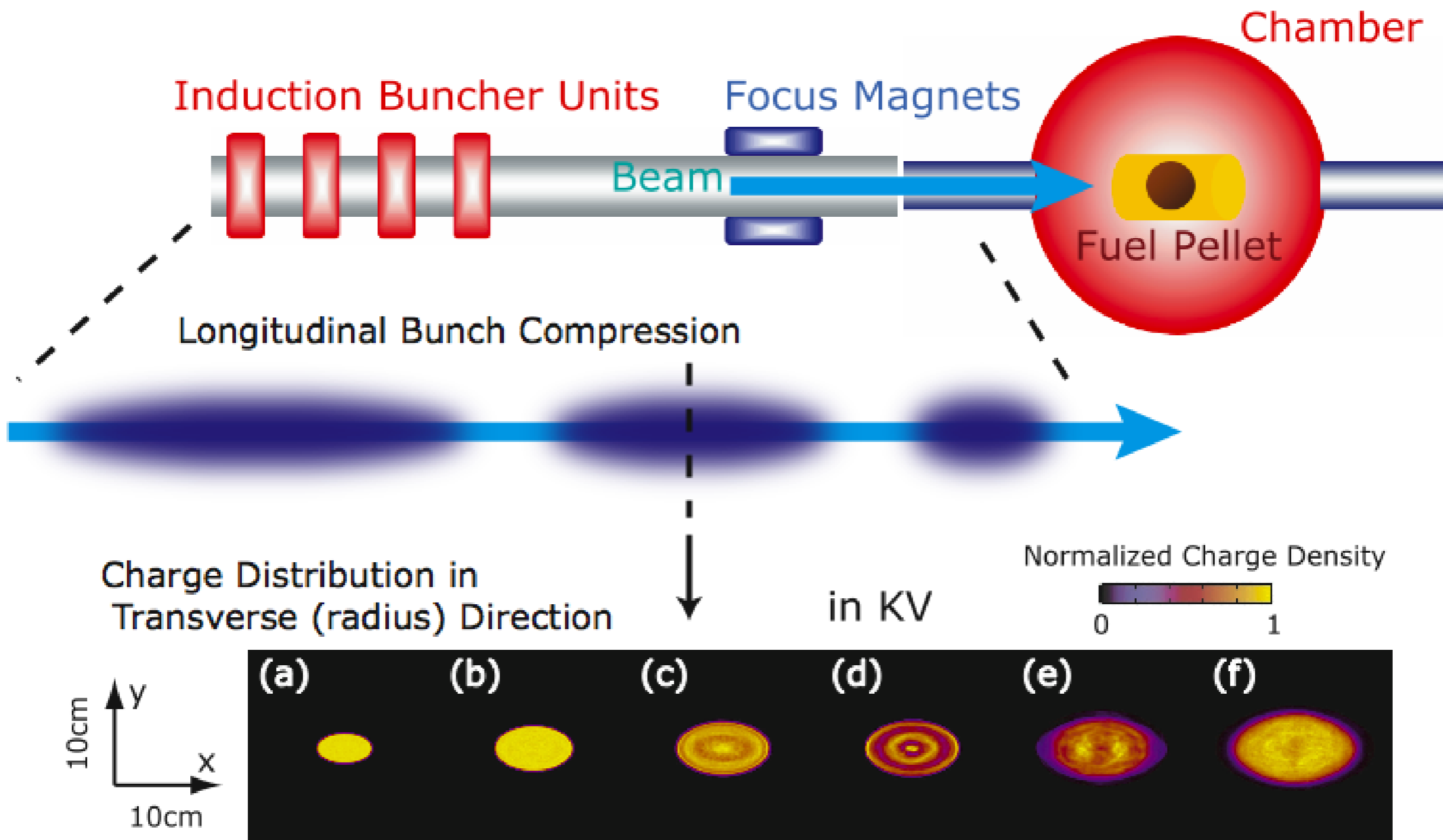


High Current Beam



Space-Charge-Dominated Beam Physics

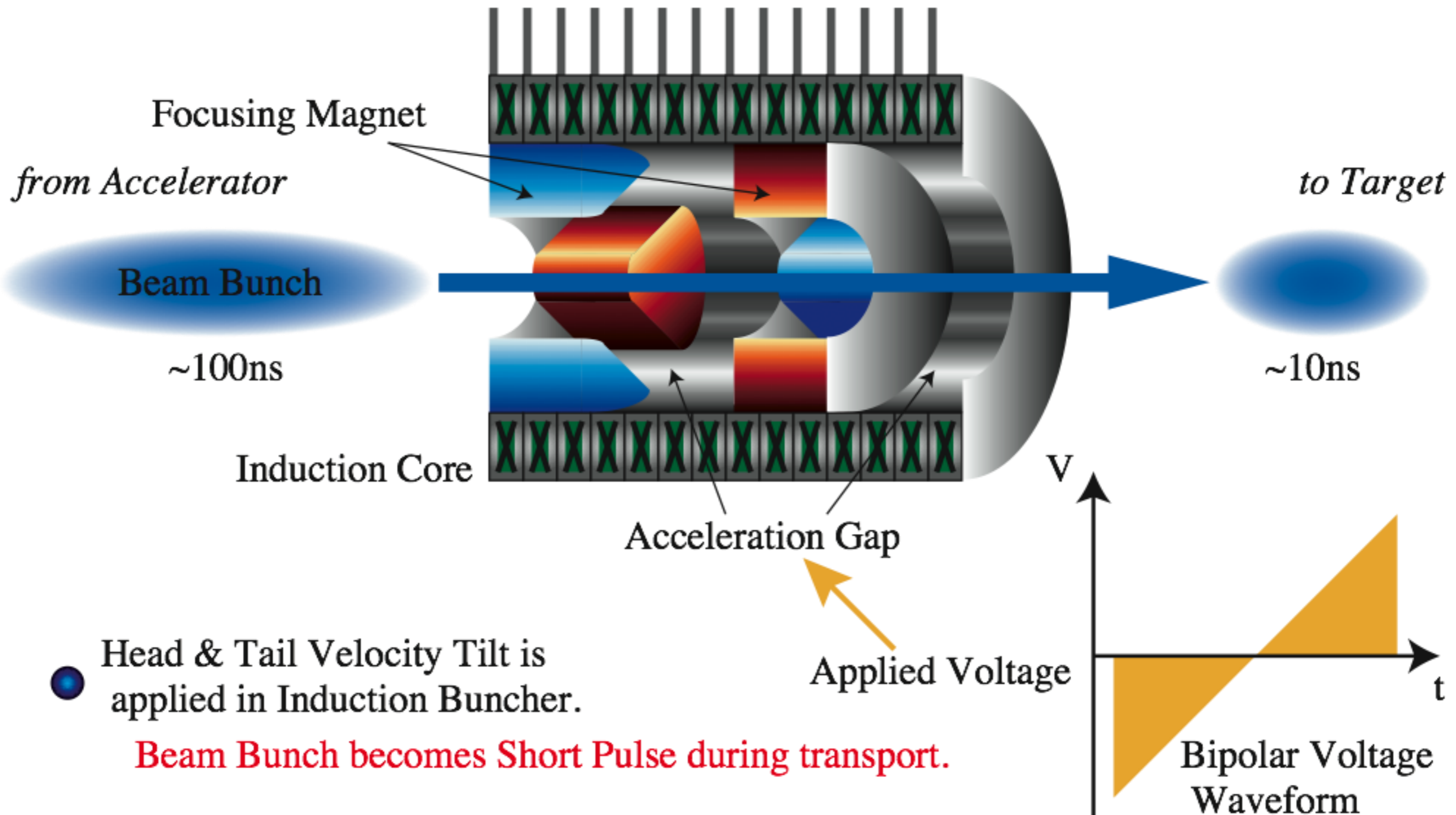
Beam Dynamics during Final Beam Bunching



T. Kikuchi, M. Nakajima, K. Horioka, and T. Katayama,
Phys. Rev. ST Accel. Beams 7 (2004) 034201.

Bunch Compression using Induction Modulator

Induction buncher consists of periodic lattice



- Head & Tail Velocity Tilt is applied in Induction Buncher.

Beam Bunch becomes Short Pulse during transport.

Purpose

Bunch Compression is key issue for effective heavy ion inertial fusion energy

- final compression ratio
- beam quality (emittance)
- pulse shape control

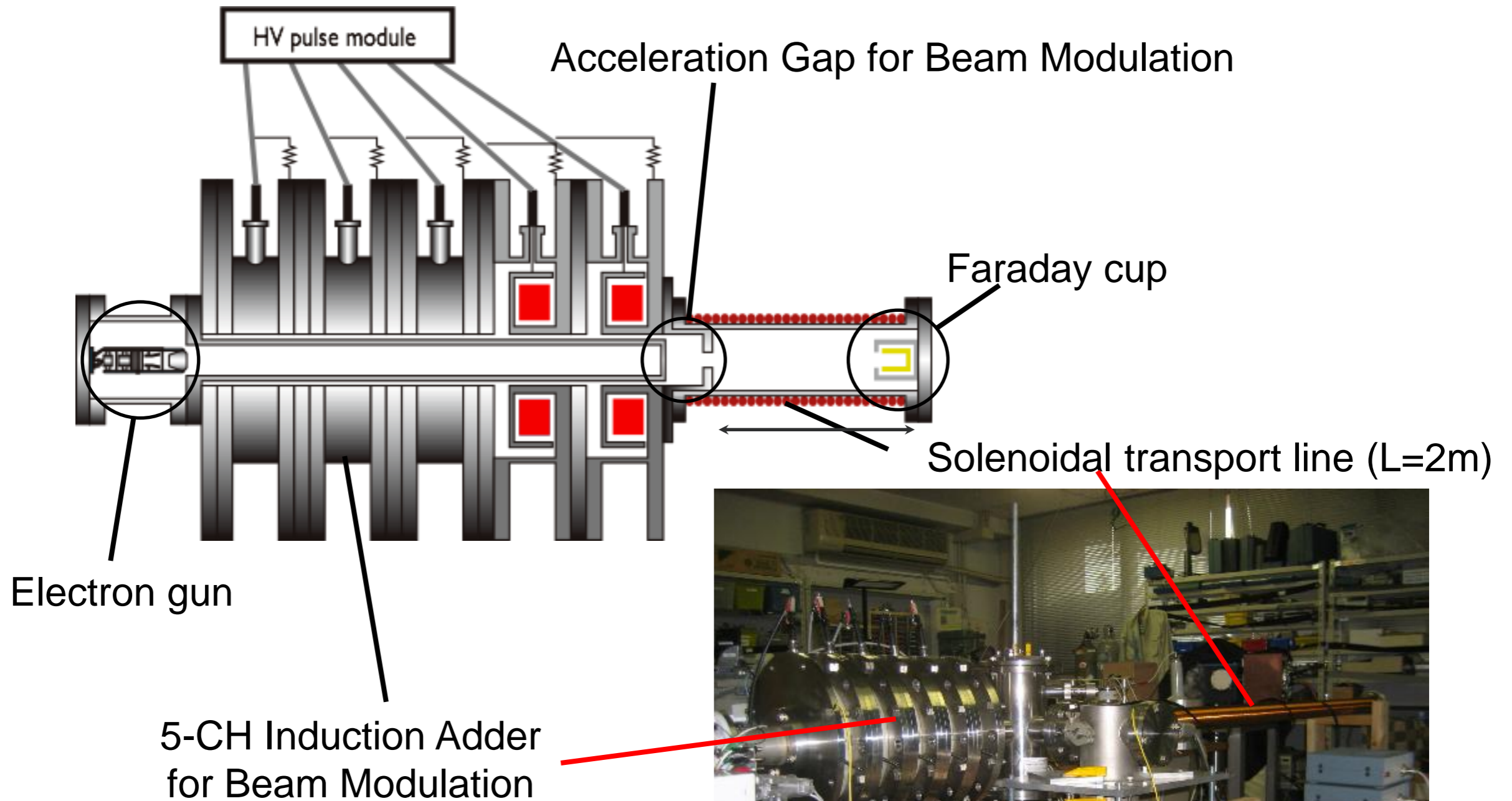
Compact Simulator by Electron Beam for Heavy Ion Inertial Fusion

Numerical Study for Electron Beam Dynamics in Compact Simulator for Heavy Ion Inertial Fusion

Research Topics: Key violation issues for extreme pulse compression

- applied voltage errors
- space charge effect
- thermal effect
- mismatch transport

Experimental Arrangement in Tokyo Tech.



courtesy of K. Horioka@Tokyo Tech.

Summary

Numerical Study for Electron Beam Dynamics in Compact Simulator for Heavy Ion Inertial Fusion

Research Topics: Key violation issues for extreme pulse compression

- applied voltage errors
- space charge effect
- thermal effect
- mismatch transport

from comparison with experimental and numerical simulation results:

- Applied voltage for the pulse compression is good enough for the operation.
- Space charge effect & initial temperature of electron bunch can interfere extreme pulse compression.
- In this experimental condition, initial temperature of electron bunch is main issue of interference for extreme pulse compression.



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