

# Optics designs for a bunch compressor in ATF2

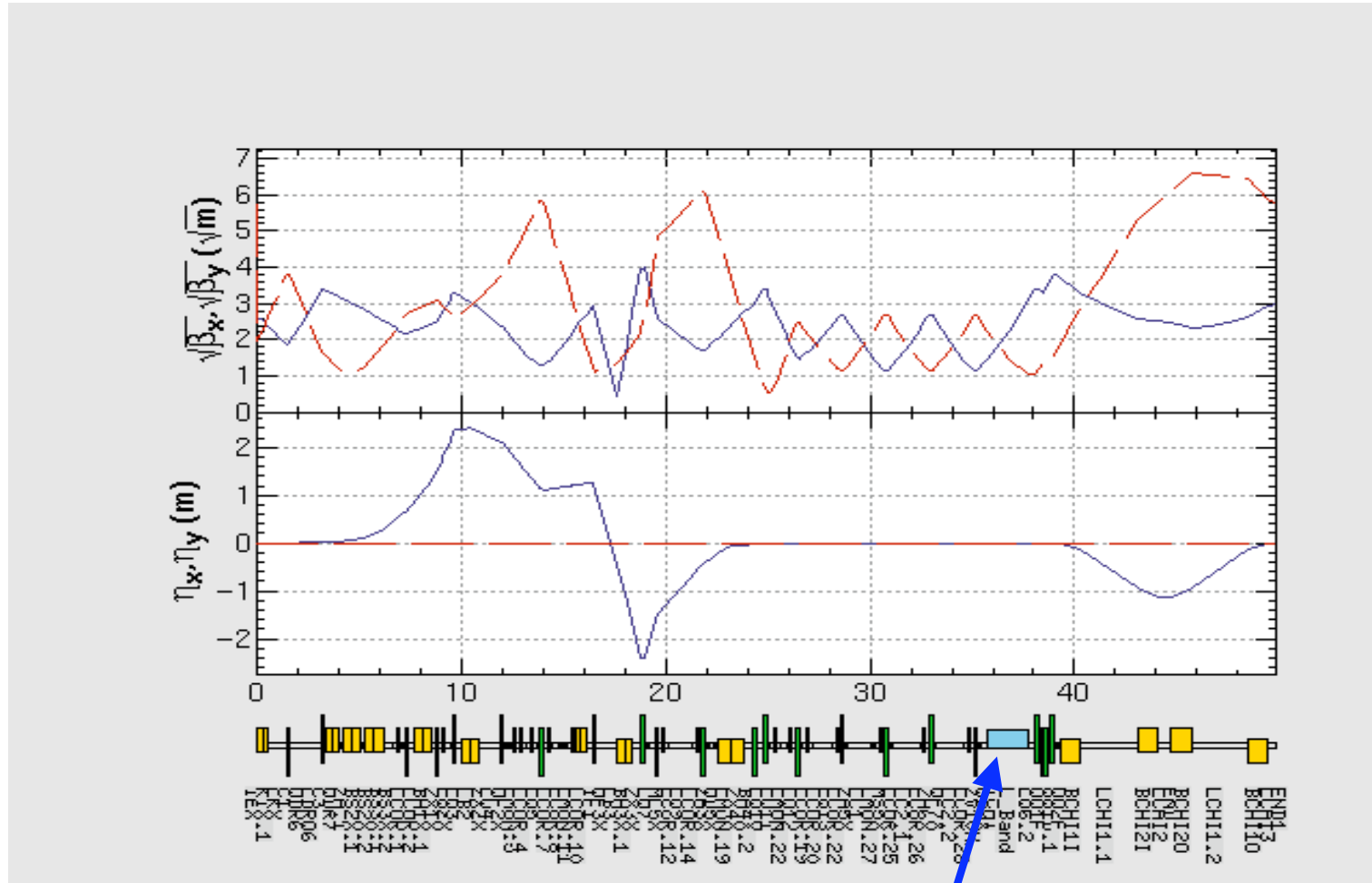
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# Introduction

- Installation of a chicane is being considered for beam diagnostics in ATF2.
- We may also utilize the chicane as a bunch compressor by adding one rf system.
  - : For this feasibility, we perform optics design and beam simulation for the bunch compressor.

# 1) Optics of extraction line + L-band rf + Chicane



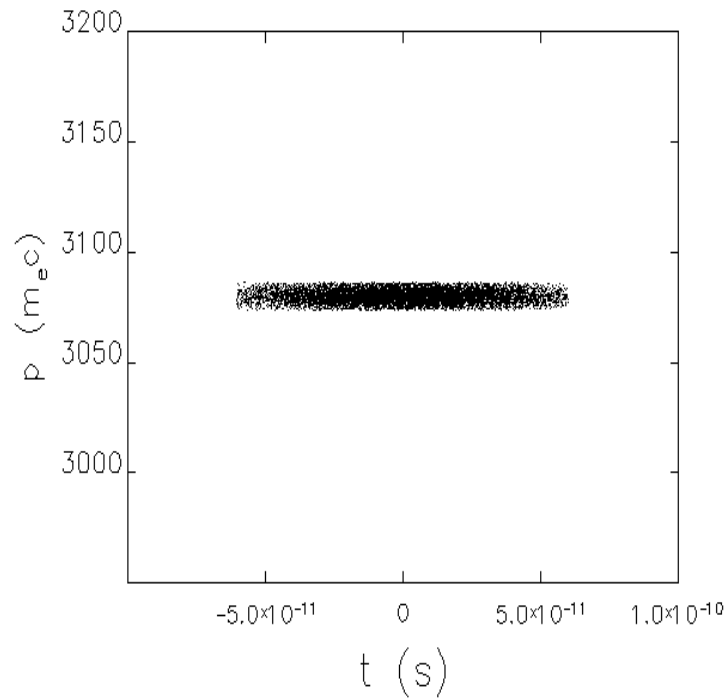
L-band rf

# Components

- **Extraction beam line** the s  
same with existing beam line
- **L-band rf**  
L=3m, 30 MV/m, phase= -90 deg. off from crest
- **Chicane**  
 $L_B=1\text{m}$ ,  $B=1.3\text{ T}$ , bending angle=0.28 radian

# L-band rf on acts a bunch compressor.

After damping ring

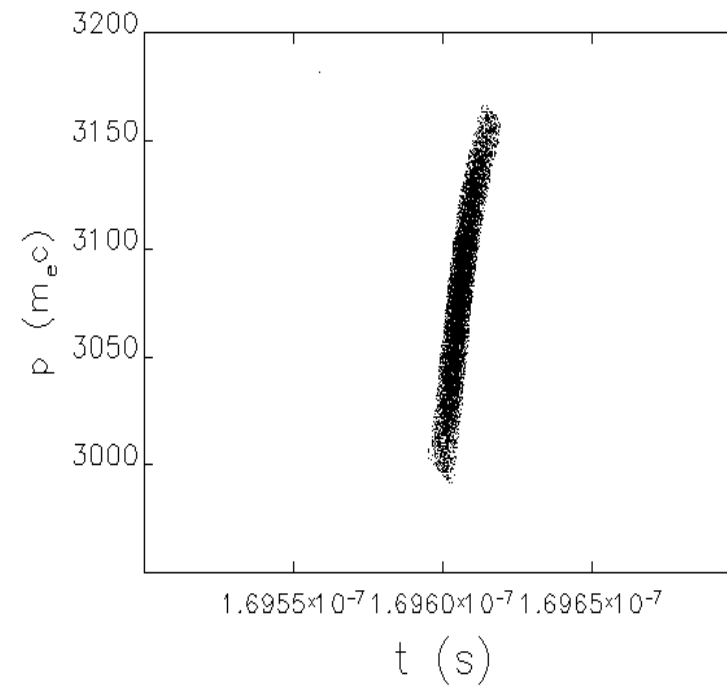


output phase space--input: atf2L.ele lattice: atf2L.lte

$$\sigma_z = 8 \text{ mm}$$

$$\sigma_\delta = 0.09 \%$$

After chicane

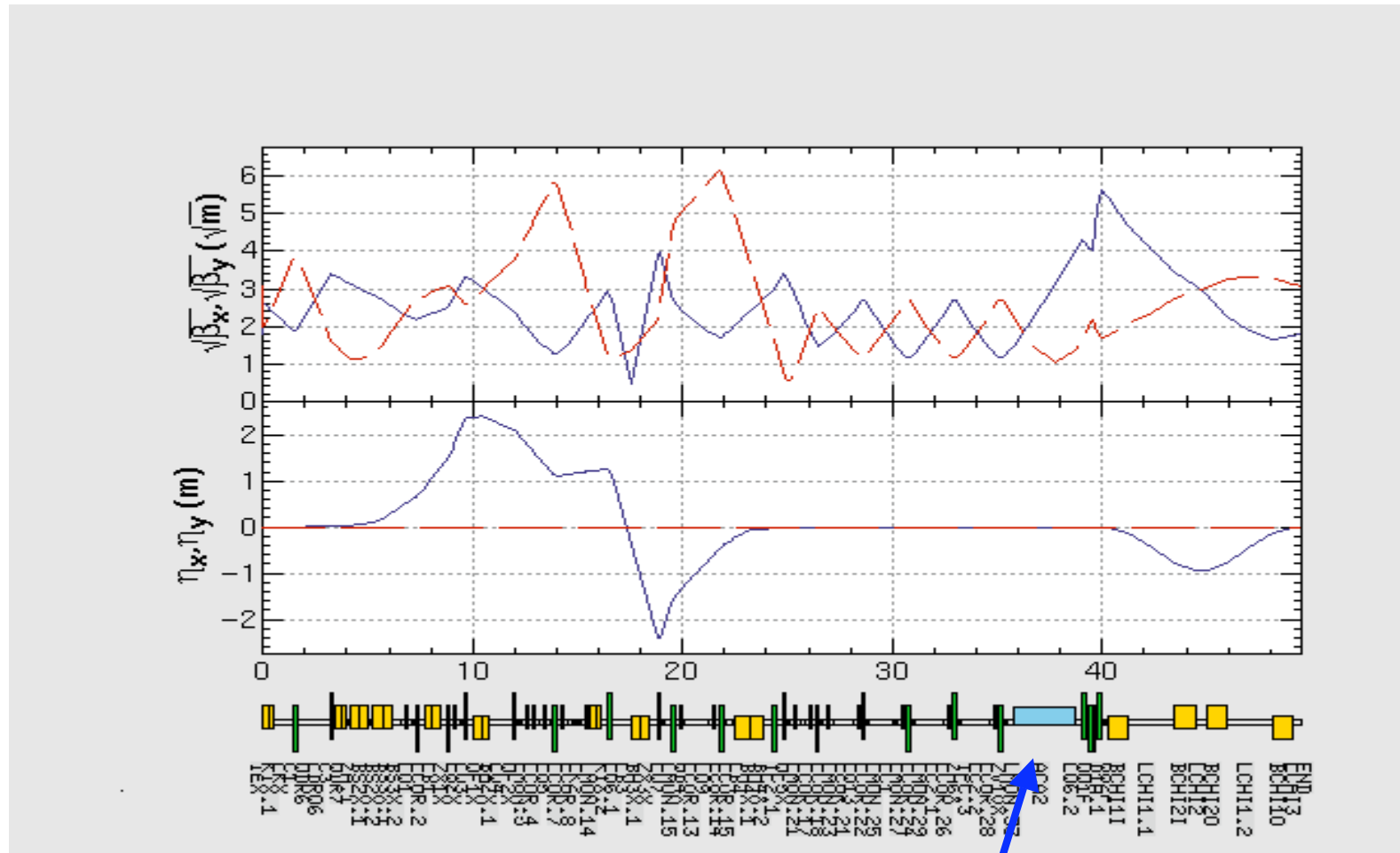


output phase space--input: atf2L.ele lattice: atf2L.lte

$$\sigma_z = 1.2 \text{ mm}$$

$$\sigma_\delta = 1.22 \%$$

## 2) Optics of extraction line + S-band rf + Chicane



S-band rf

# Components

- **Extraction beam line**

the same with existing line

- **S-band rf**

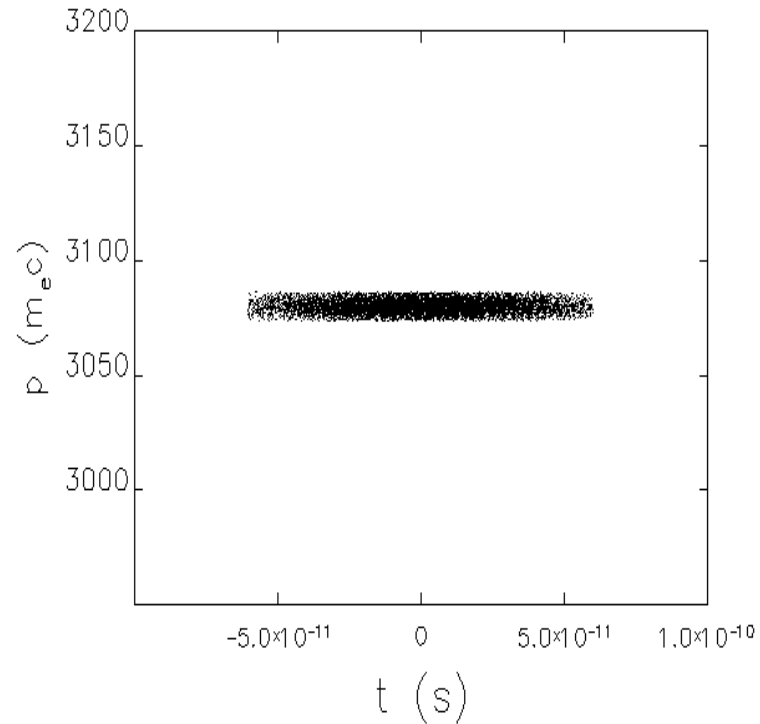
$L=3\text{m}$ ,  $16\text{ MV/m}$ ,  $\text{phase}=-90\text{ deg.}$  off from crest

- **Chicane**

$L_B=1\text{m}$ ,  $B=1.3\text{ T}$ ,  $\text{bending angle}=0.28\text{ radian}$

## S-band rf on acts a bunch compressor.

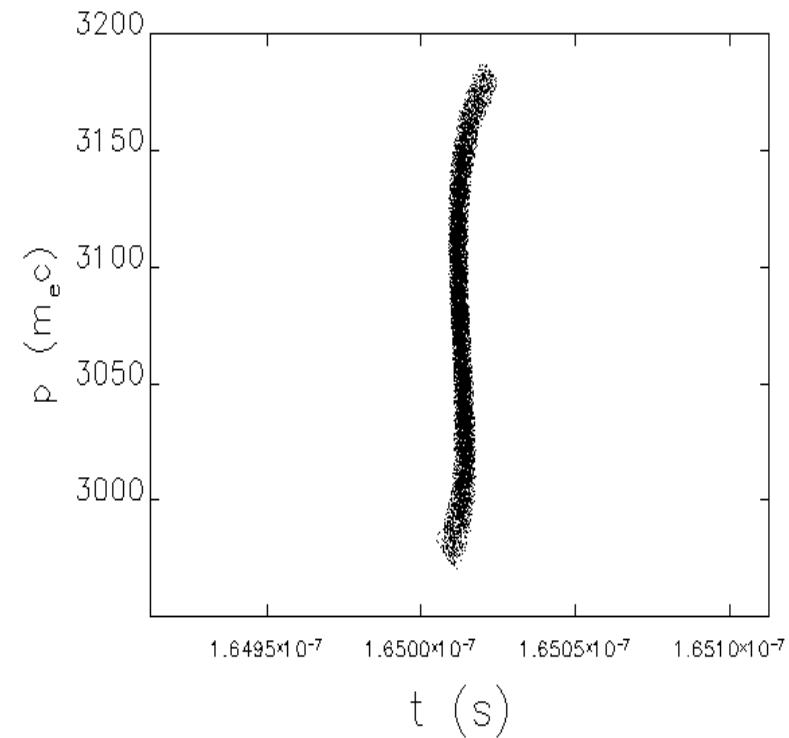
After damping ring



output phase space--input: atf2L.ele lattice: atf2L.lte

$$\sigma_z = 8 \text{ mm}$$
$$\sigma_\delta = 0.09 \%$$

After chicane



output phase space--input: atf2.ele lattice: atf2.lte

$$\sigma_z = 0.66 \text{ mm}$$
$$\sigma_\delta = 1.67 \%$$



# Summary / Plans

- One rf system with ~3 m long may be used for a bunch compressor. Compression factor of 5~10 may be obtained.
- We need estimation of tolerances and more optimization for the bunch compressor.
- Matching with Final Focus optics remains.
- Hope to work together tuning of Final Focus optics, if is available.