MEBT diagnostics

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CCL diagnostics

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Considerations

- Cost and schedule consistent with commissioning plan
- Accelerator physics requirement
- Device location and design
- Beam pulse length, duty factor from thermal/stress analysis
- Material choice
- Data acquisition system

MEBT in-line emittance device (baseline)

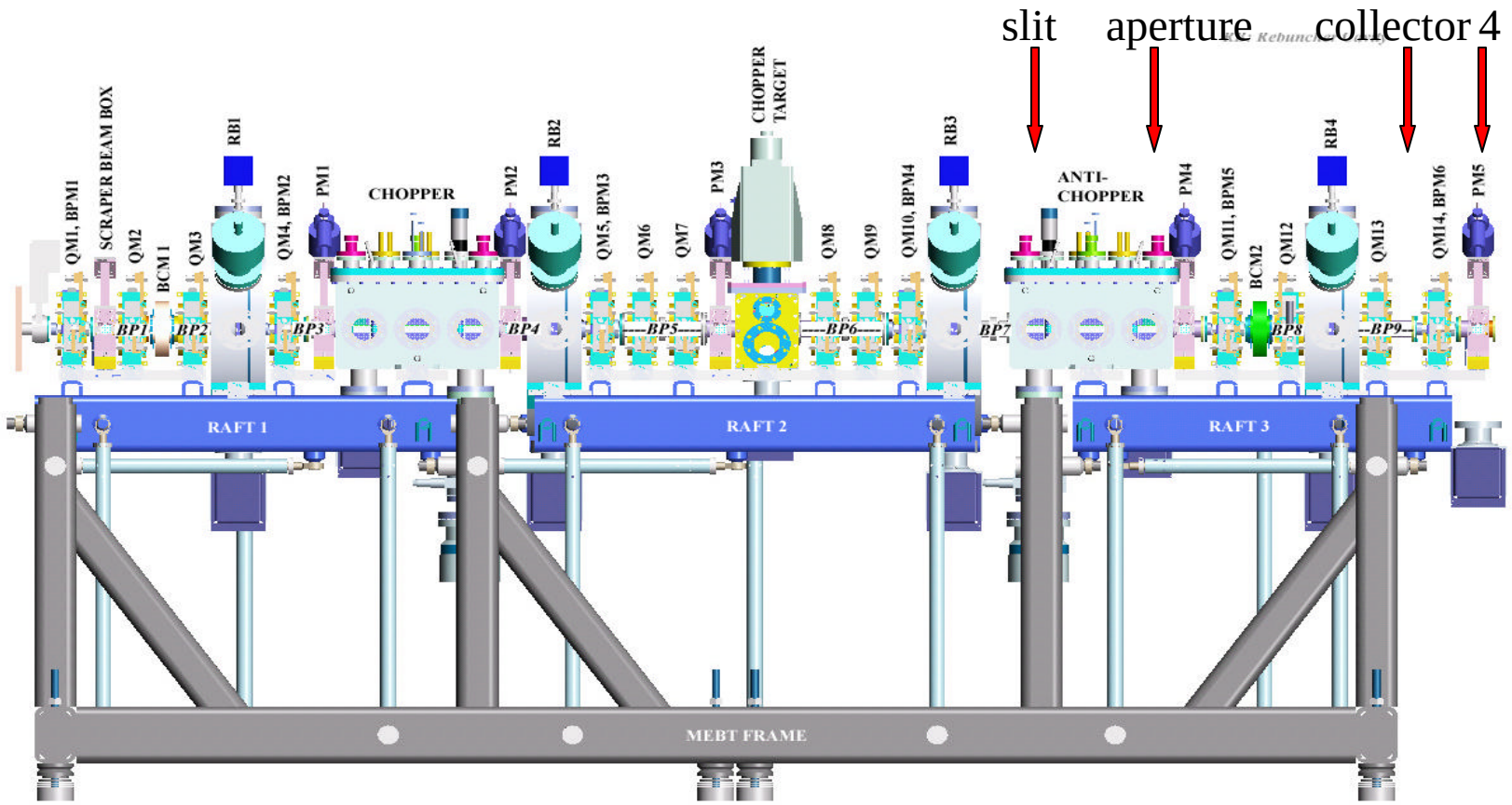
To measure 1) Courant-Snyder parameters 2) emittance 3) beam distribution

- Layout/design
  - slit/collector location
  - slit/collector design and pulse length/duty factor (thermal/stress analysis)
  - cooling
  - beam box design
  - data acquisition system
- Schedule – ready by DTL tank 1 commissioning with D-plate

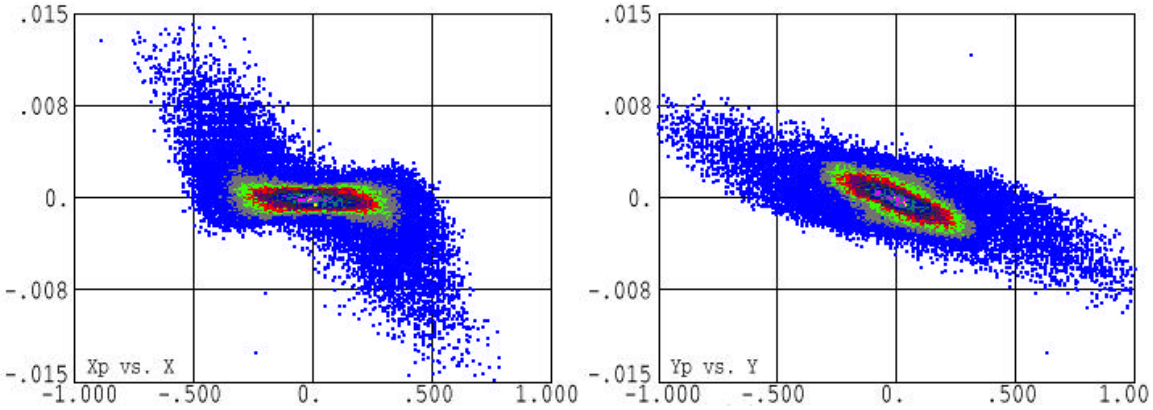
MEBT aperture for pencil beam

anticipated for DTL 1 and downstream linac commissioning especially SCL

- circular aperture possibly mounted on pneumatic actuator
- determine pulse length and duty factor (thermal/stress analysis)
- aperture location
- matching to DTL
- Schedule – ready by DTL tank 1 commissioning with D-plate

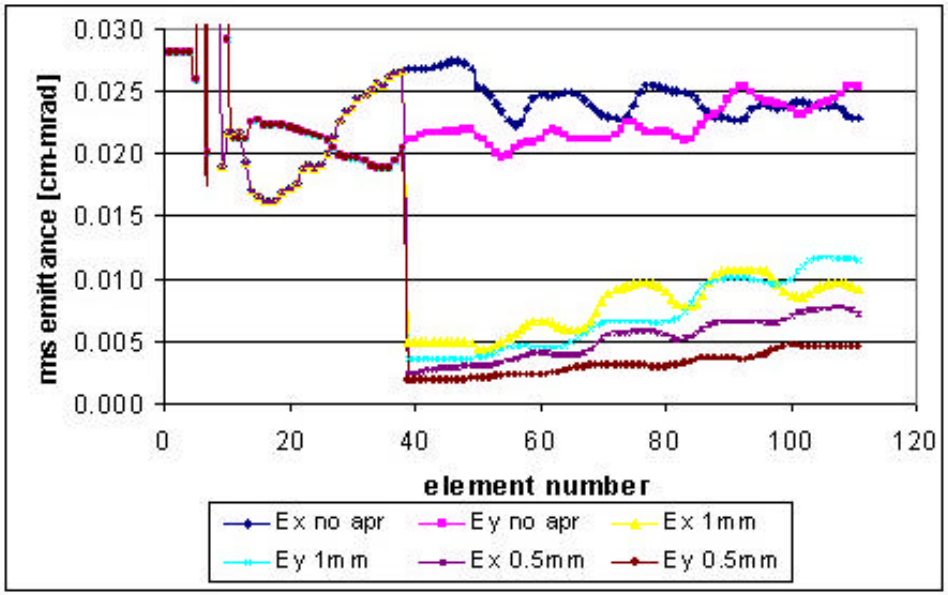


slit to collector distance is ~0.89m



Projections of beam distribution
At the slit

MEBT aperture



Plots of rms emittance from MEBT to DTL tank 1
Showing that scraped beam is well matched to DTL tank 1
DTL tank 1 starts from element number 51.

CCL Bunch Shape Monitors

Use of three BSMs are proposed to verify longitudinal matching of DTL to CCL

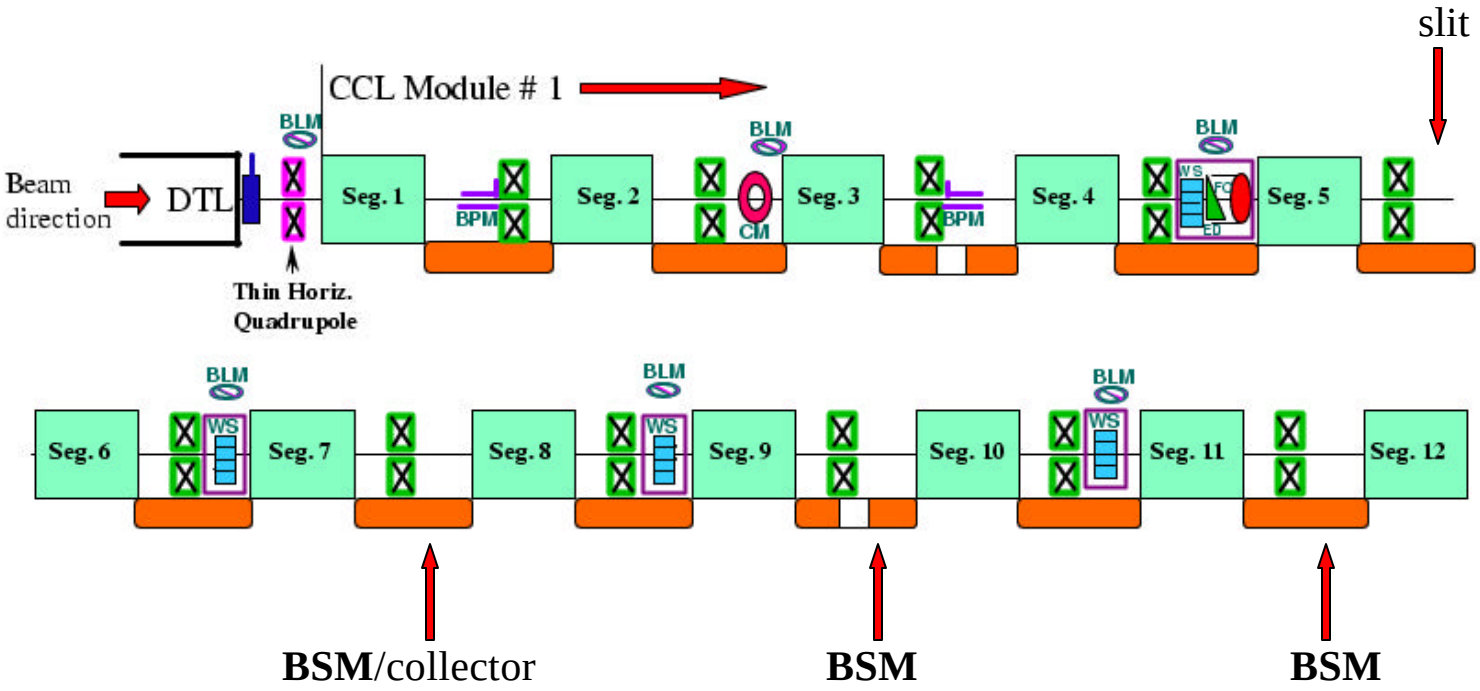
- physics study is complete to determine the optimal location of BSMs
- 20% or less (rms phase width) measurement uncertainty is required
- First BSM article ready by DTL 1 commissioning, the rest by CCL commisioning

CCL in-line emittance device

- Unique diagnostics to establish transverse matching from MEBT to DTL
- Measure Courant-Snyder parameters, emittance, and beam distribution

- Layout/design
  slit/collector location is determined
  slit/collector design and beam pulse length/duty factor (thermal/stress analysis)
  cooling
  beam box design
  data acquisition system
- Schedule – ready by CCL commissioning with D-plate

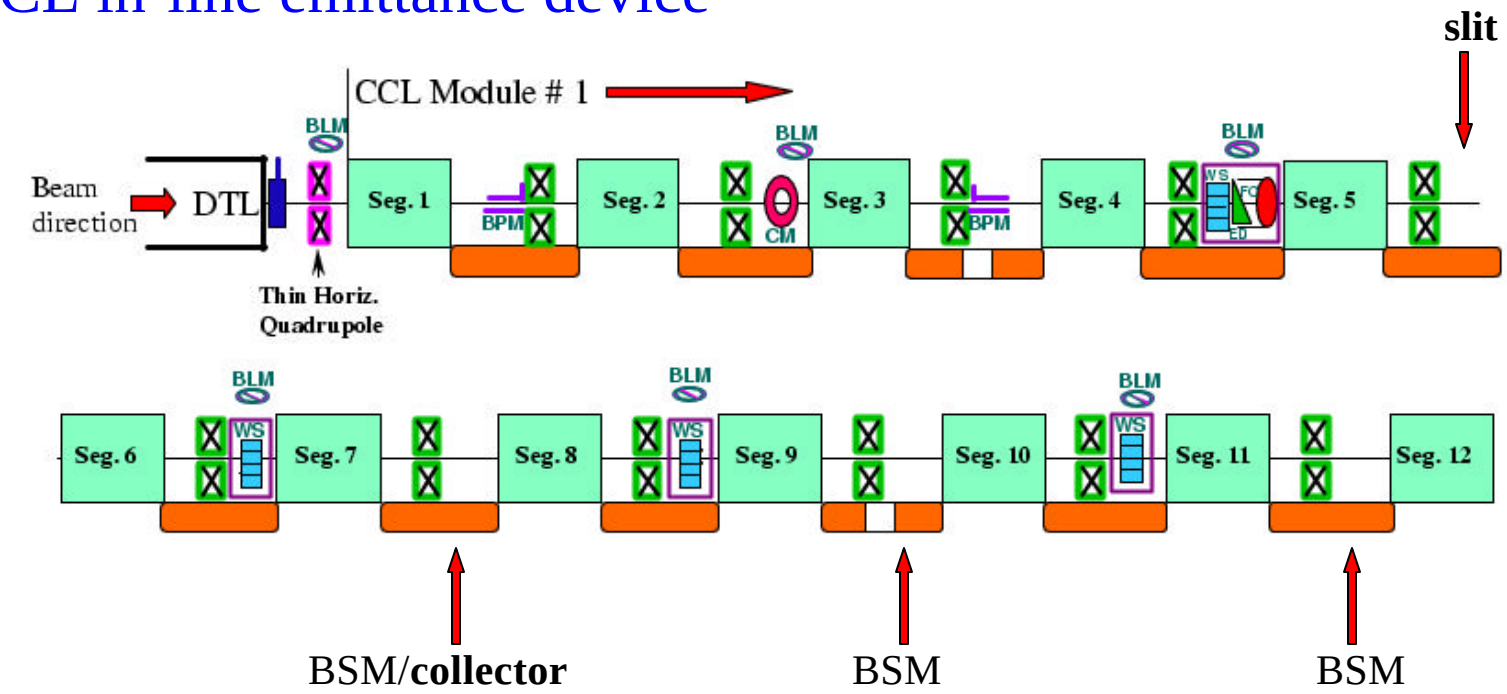
BSMs



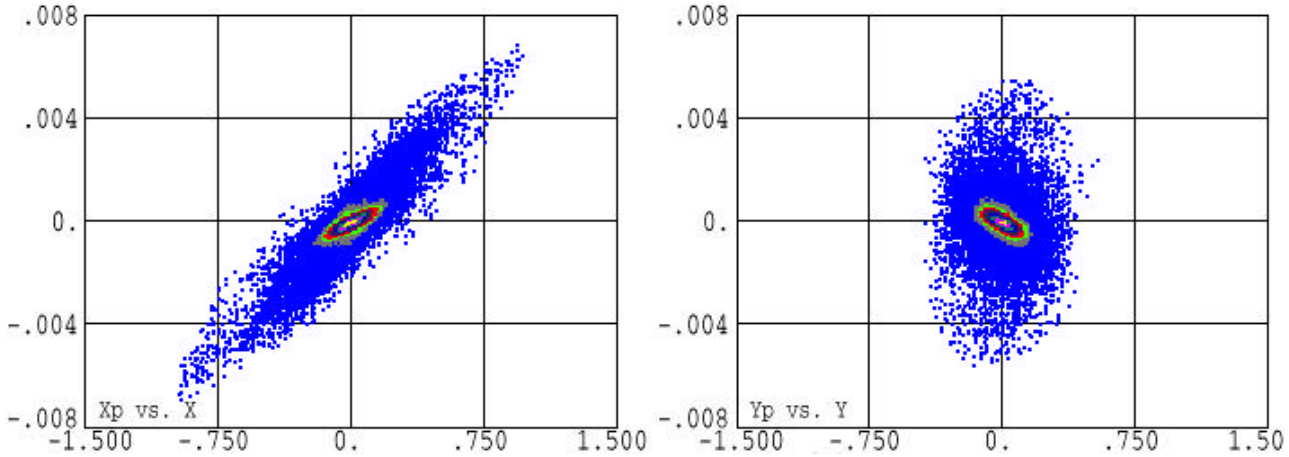
rf set point obtained with the usage of three BSMs

	Mt1.0 Mz1.0	Mt1.0 Mz0.8	Mt1.1 Mz1.3	Mt1.3 Mz1.3
$\Delta\phi$ [deg]	-1.57	0.32	-1.61	-0.74
ΔA	0.995	0.982	1.023	1.007

CCL in-line emittance device



slit to collector distance is 2.0384 m



Projections of beam distribution at the slit with modified quad setting