XFEL Beam Collimation and Switchyard Review
Diagnostics
Transverse Feedback

FEL-Beam-Dynamics Group

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	#	Where	For what	Remark
Synchrotron radiation camera	2	Collimation	Online monitoring of beam shape	Foresee SR ports
Wire/OTR station	4	Collimation	Offline beam size measurement and optics matching	Design (fast moving wire) open
Wire station	4	Before SASE1	Verify optics match	Design open, number sufficient ?
Bunch compression monitor	1	After collimation	Check compression in collimation	Special diagnostics
Dark current monitor	2	Before/after collimation	Check dark current collimation efficiency	Design open
Beam current monitor	4	Before/after collimation, before undulator	Check current, beam loss, machine protection	
Beam loss monitors	?	Distributed	Check beam losses	Which design

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	#	Where	For what	Remark
Standard BPM's	75	Every quad	Monitor beam position	Button (20-40 µm)
High Precision BPM's	2 1 4	Before collimation Collimation Before Undulator	Measure launch Measure energy Measure launch	Cavity (1 µm)
Feedback BPM's	4	Before/after FB kickers	Intra bunch Feedback	Cavity (1 µm) Low-latency electronics
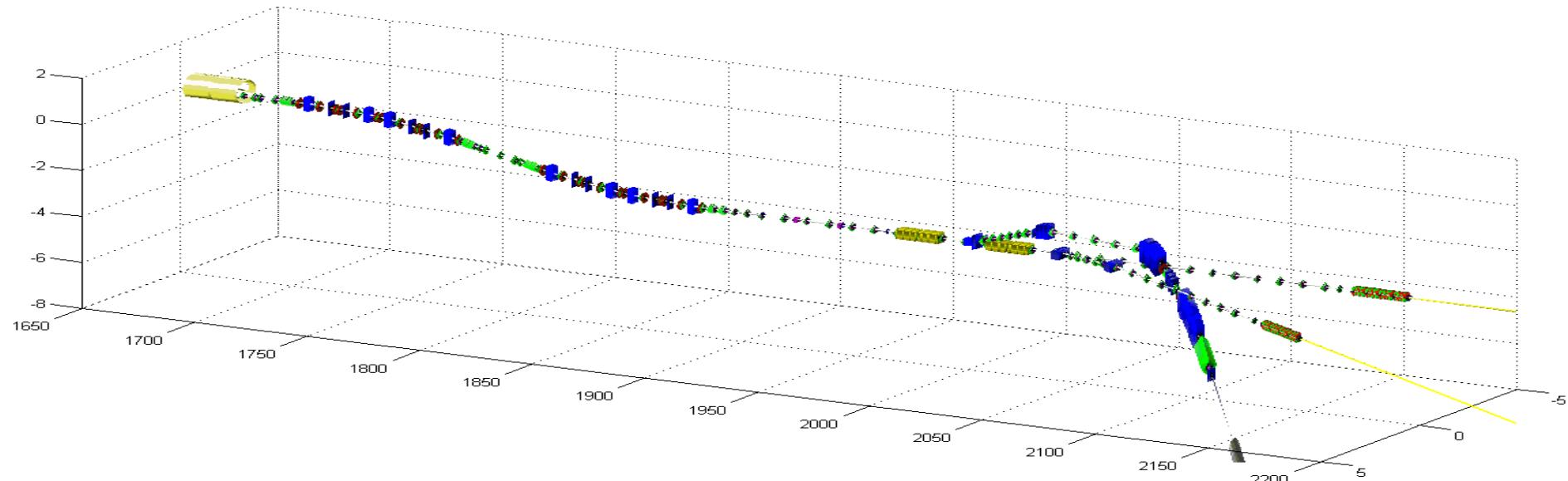
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PSI contribution, summary of last weeks meeting:

- General layout
    - stabilization of train to train and intra-bunch jitter
    - one system at 130 MeV (injector diagnostic section)
    - one system at 17.5 GeV (after collimation)
    - 'strong' (± 250 μm) low bandwidth (< 10-20 kHz)
    - 'weak' (± 25 μm) large bandwidth (up to 5 MHz)
    - exact distribution of frequencies and power depends on estimated jitter power spectrum

optimize transfer functions
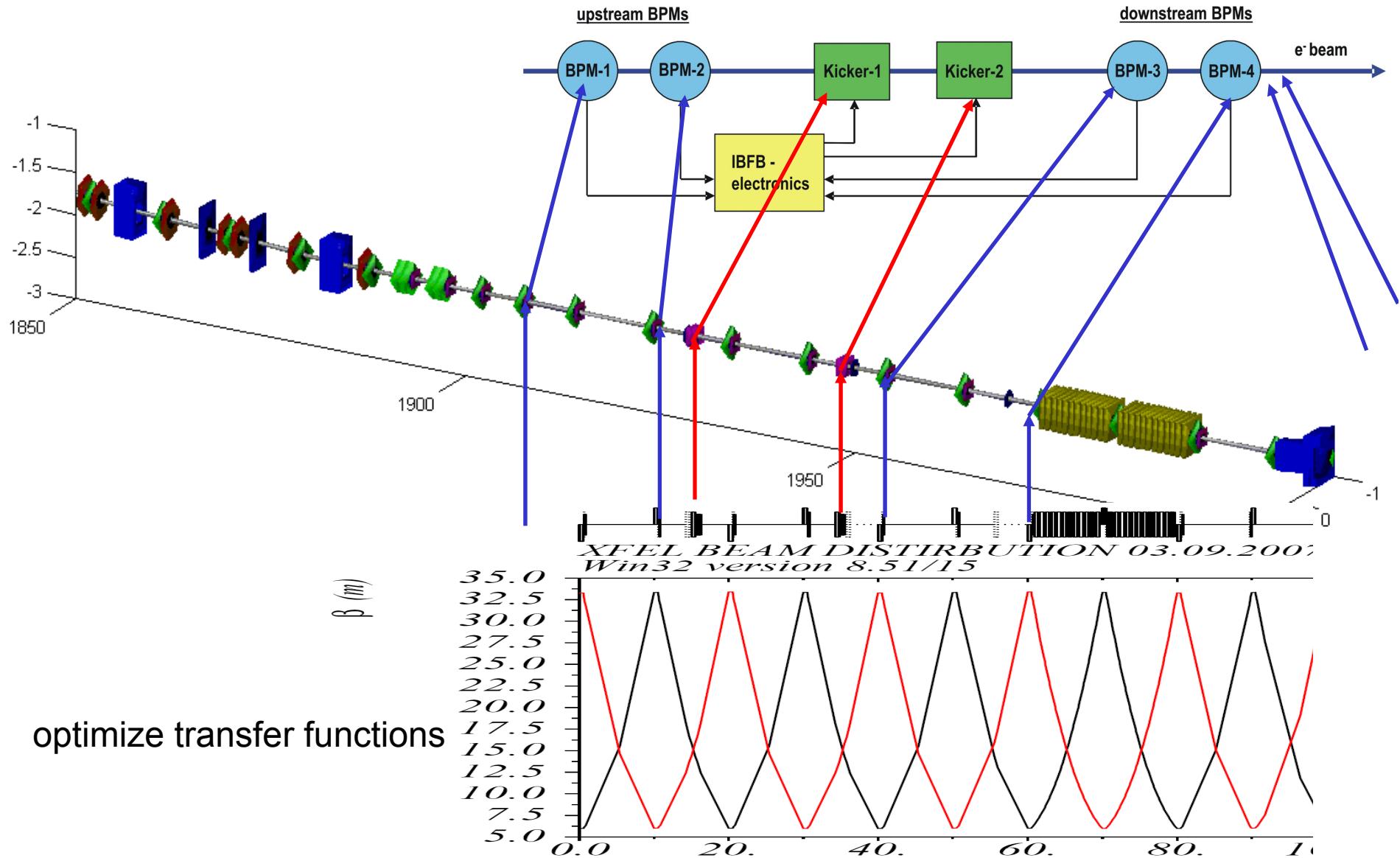
- Fix final energy by measuring beam position
  - incoming beam (no dispersion) with $\sigma = 1\mu m$
  - beam in dispersive ($D_{y,max} = 10$ cm) section with $\sigma = 1\mu m$
- Mean energy measured with approx. 2e-5 accuracy

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- Fix collisions

- Tolerance calculations and budget

- Verify diagnostics concept

- Verify matching flexibility

- Integrate feedback

- Specify secondary spoilers

- Integrate machine protection system aspects

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