XFEL
X-Ray Free-Electron Laser

DESY

XFEL Beam Collimation and Switchyard Review
Introduction

FEL-Beam-Dynamics Group

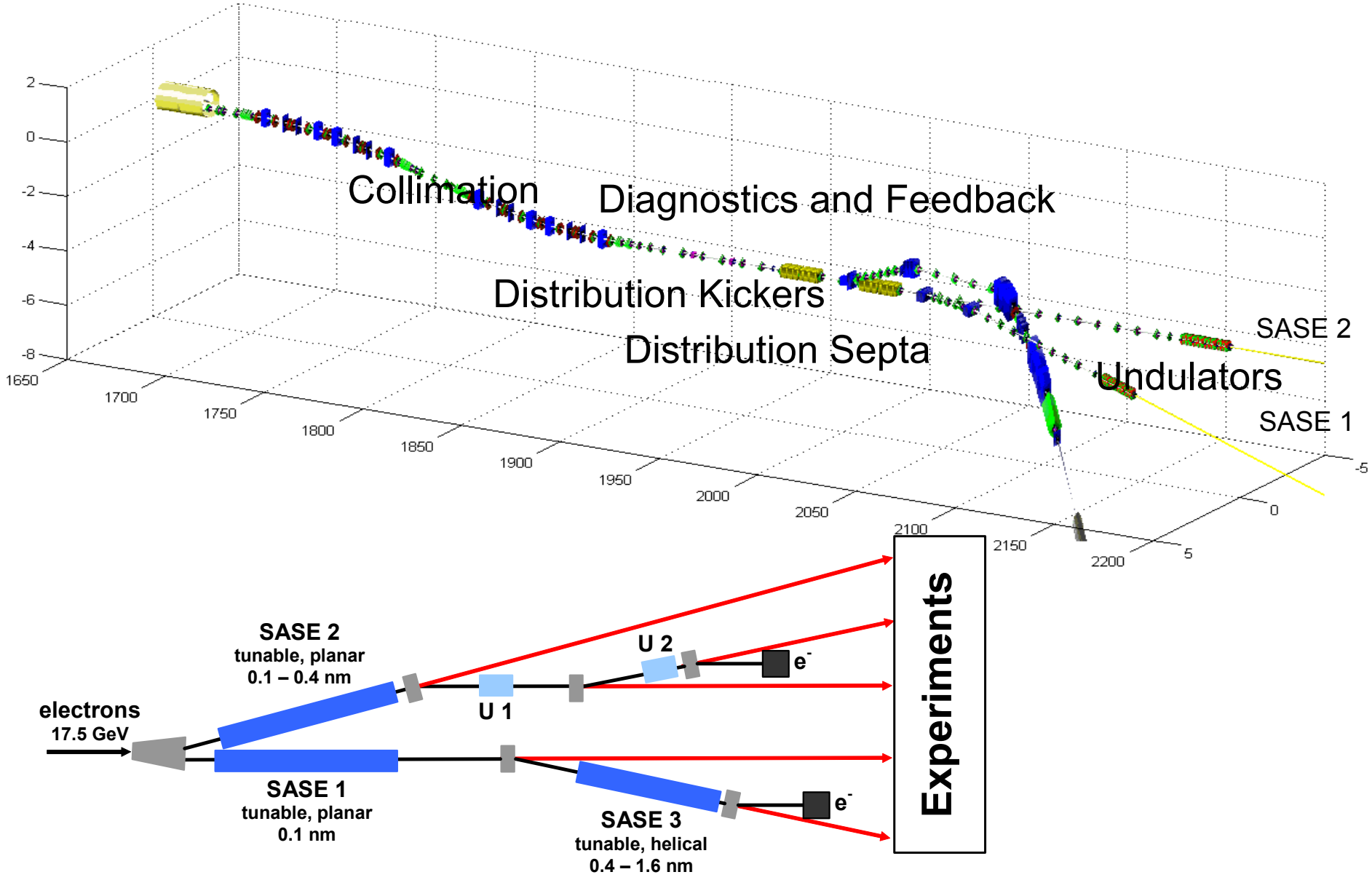
3.12.2007

Winni Decking

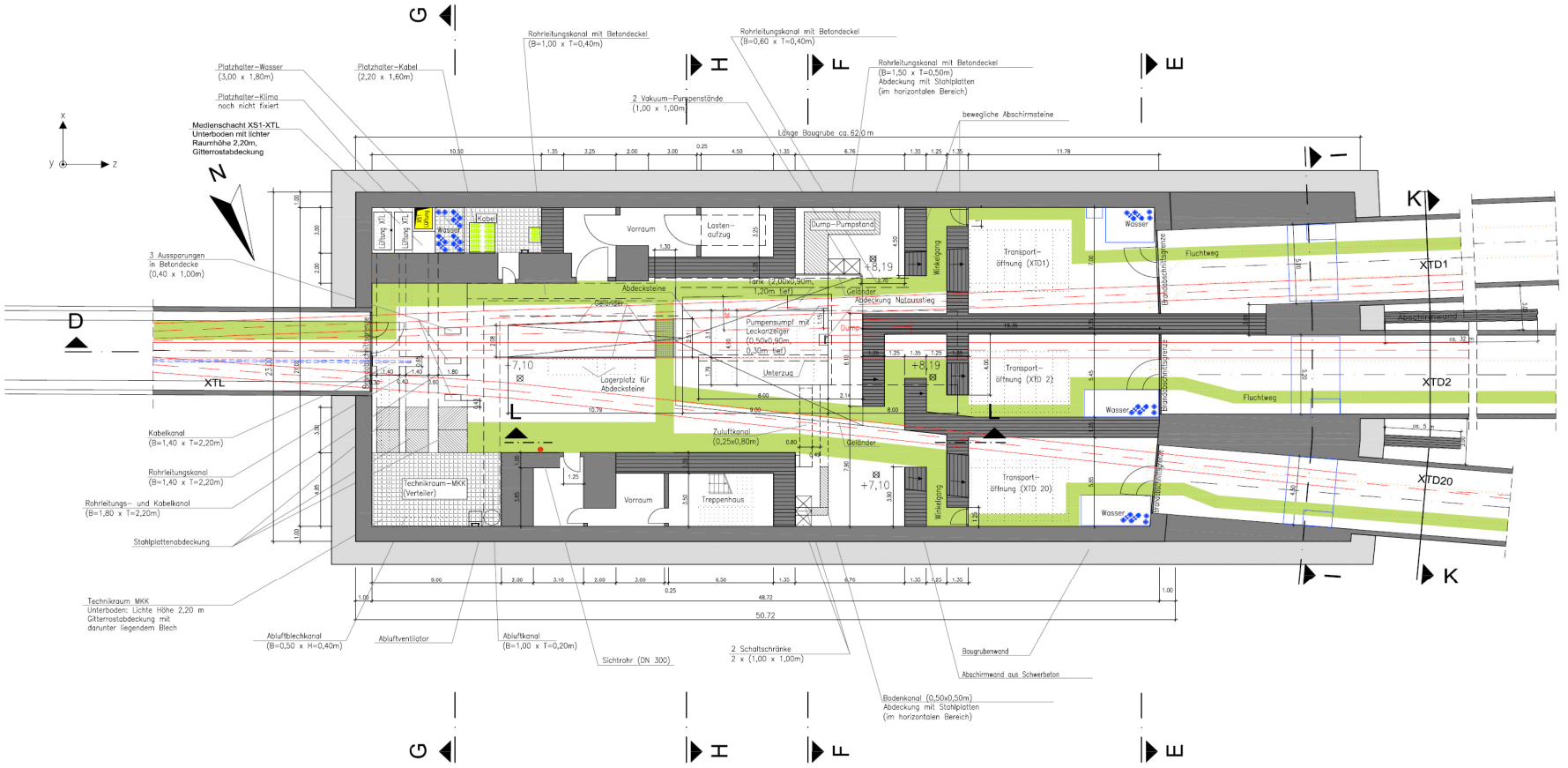
Review Charge

- Review status of various involved work-packages
- Find (and resolve) misunderstandings and misinformation
- Openly discuss unresolved topics, specifications, etc.
- Agree on time line

Collimation and Switchyard



XS1 Top View



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Boundary Conditions

- Power and cooling infrastructure located in building/shaft XS1 (Osdorfer Born site)
- Start point of section after linac, 1650 m from gun
- If only 84 modules in main linac, warm section of 200 m before
- Energies:
  - 6 GeV far future CW option
  - 17.5 GeV nominal operation
  - 25 GeV maximum envisioned energy range
- Energy bandwith:
  - ± 1.5 % top quality acceptance
  - ± 2.5 % transport acceptance

Functionality

- Beam Collimation
  - emergency beam stop
  - halo collimation
- Transverse and energy feedback
  - fix launch conditions within bunch train
- Beam Switchyard
  - distribute bunches within train to beam dump, SASE2, SASE1 and (far future) additional FELs

Basic Parameters for Beam Line Layout

- Energy range 6 – 25 GeV

  Operating range for magnets, diagnostics

- Emittance at end of linac
  - Nominal: ε_N = 1.4e-6 m (projected)
  - Smallest: ε_N = 0.8e-6 m (projected)

  Apertures, machine protection, …

- Energy spread
  - Bunch train : 0% - ± 1.5%
  - Single bunch uncorrelated: 2.5 MeV RMS (= 0.0125% at 20 GeV)
  - Single bunch correlated: 0% - 0.01%

  Apertures, beam sizes, chromatic correction, …

- Bunch charge
  - ?? nC to 1 nC

  Machine protection, diagnostics

Agenda

14:00-15:30

- Section Overview – Winni Decking
- Collimation Section – Nina Golubeva, Vladimir Balandin
- Beam Switchyard – Winni Decking
- Installation, Tunnel Layout – Norbert Meyners
- Beam Distribution Kicker – Frank Obier
- Septum Magnets – Bernie Krause, Sasha Petrov

15:45-16:45

- Vacuum System – Torsten Wohlenberg
- Impedance Budget – Igor Zagorodnov
- Diagnostics, Fast Transverse Feedback - Winni Decking