CDR Meeting

ESTIA Bunker Feeder

PSI, Villigen – 2017-10-09
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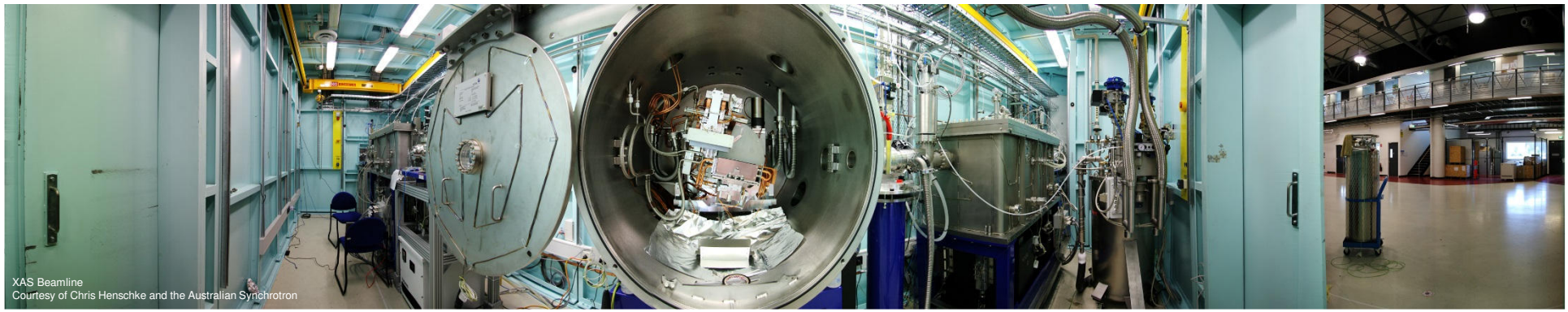
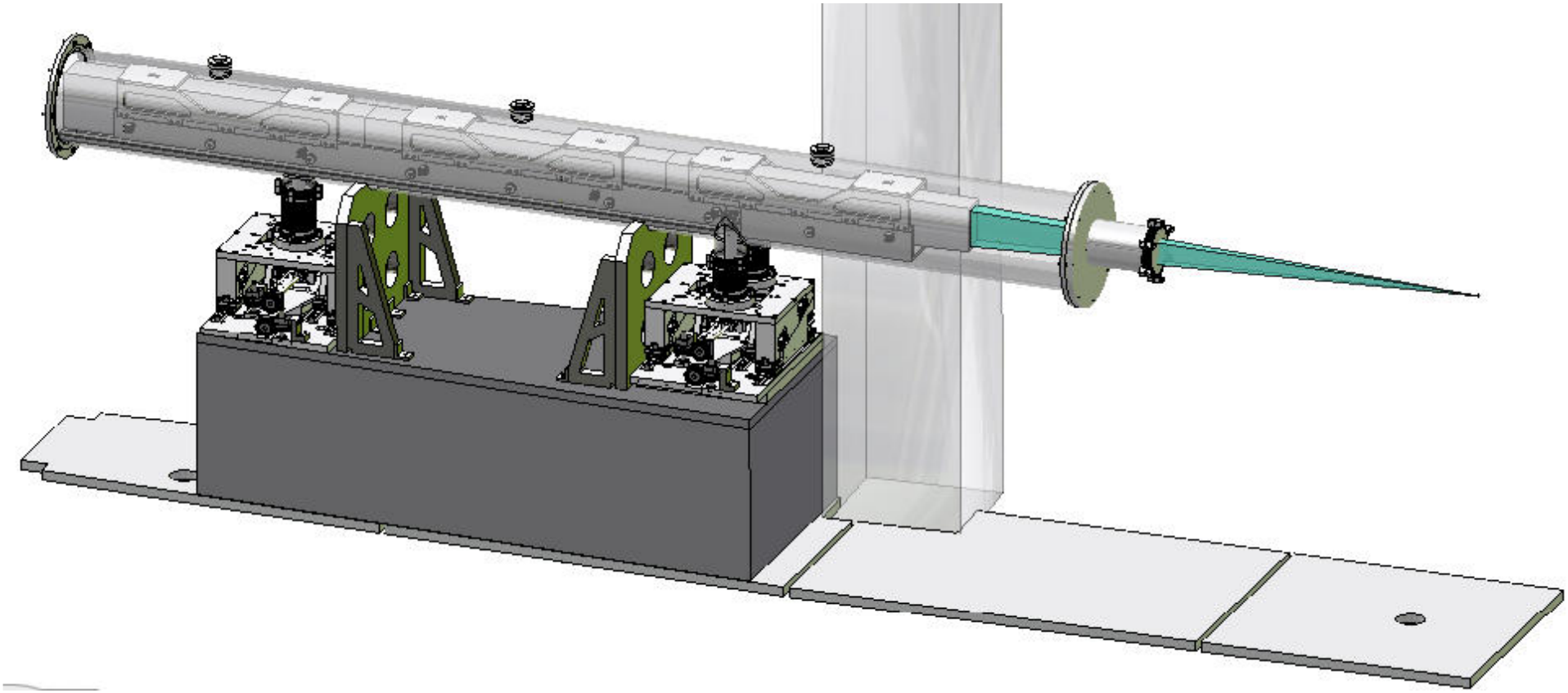

XAS Beamline
Courtesy of Chris Henschke and the Australian Synchrotron

Project Overview



Project Overview

Aspects covered driving the design:

- Space envelope
- Geometry / coordinate system
- Interfaces
- Design requirements on motions

Concepts:

- Decoupling optics vs. chamber
- Alignment and setup
- In-bunker handling

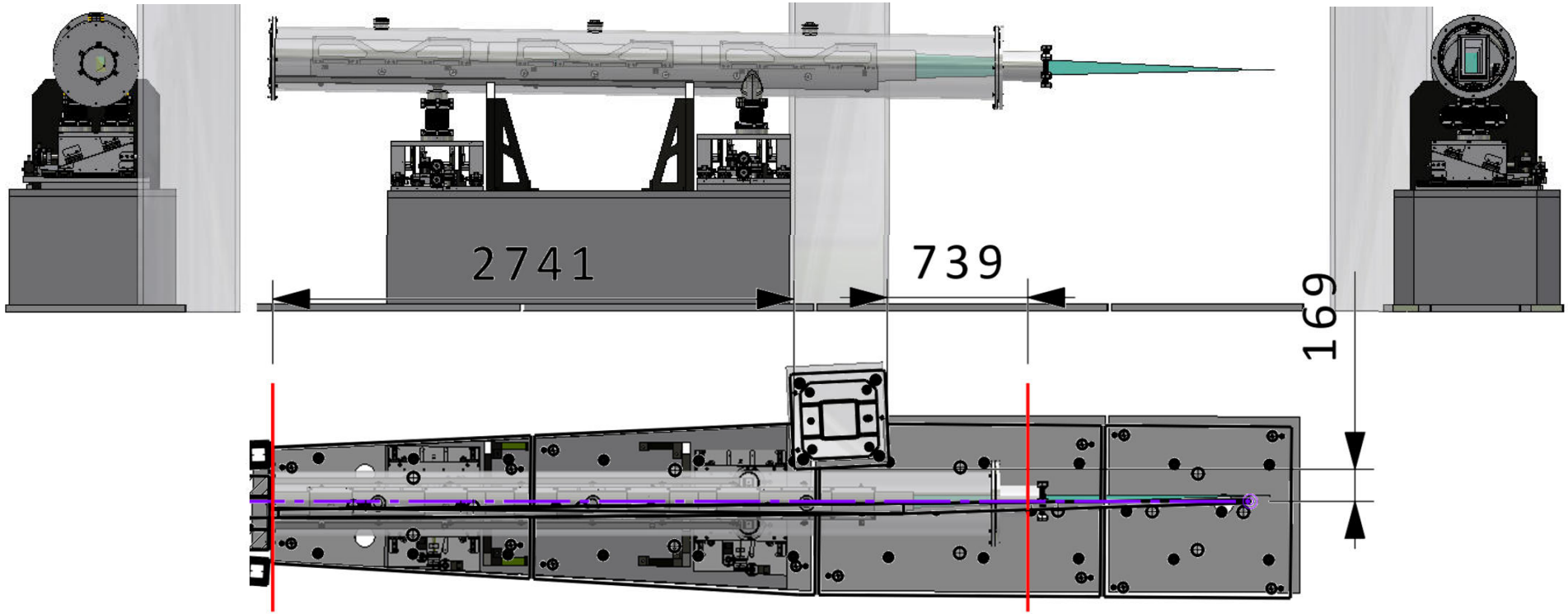
Open issues:

- Materials
- Exact neutron guide design
- In-bunker installation/deinstallation
- Floor interface / grouting plates
- Entrance window size
- Pumping / monitoring of vacuum

Design Aspects

- Space envelope
  - 6° Wedge
  - Interfering bunker structures
- Geometry / coordinate system
  - 0.7° inclination of chamber long axes
  - Entrance/exit flanges perpendicular to beam axes (0.7° tilted)
  - Length (start/end) of vacuum chamber and guide according to drawing ESS-0050413.3
  - Downstream reduction of beam tube following beam cross section
- Interfaces
  - Upstream: air gap to shutter
  - Downstream: to bellow/chopper pitch
  - Mechanical:
    - remote adjustments of optics
    - Alignment/survey of optics
    - Floor fixation
    - Number, size, design of guide elements
  - (Vacuum pumping) -> pumped by downstream sections
- Design requirements on motions
  - Strokes and axes define vacuum tube cross section (in conjunction w/ guide + support)
  - Remote interface

Design Aspects



Design Concepts

- Decoupling optics vs. chamber
  - Fully decoupled approach – arguments exchanged
  - Adjustment stages carry only in vacuum support and guide
  - Chamber mounted to base structure (concrete)
- Alignment and setup
  - System can be (fully) set up outside of bunker
  - Optical path set up w/o chamber first, precise alignment of guide elements
  - Integration of optics to chamber
  - Verification of alignment inside chamber
  - Handling of the whole system as as unit
- In-bunker handling
  - Lift full system inside bunker to location
  - Check and align optics w/ remote survey + adjustment
  - (Q) how to fix system to ground ?
  - (Q) how to release system from crane ?
  - (Q) how to connect flanges (at least downstream to bellows) ?

Open Issues

- Materials
  - (trying to) Observe document NOSG-220725475-021017-0820-4.pdf
    - Kammer, (Eintritts-)Flansche, Fenster: Aluminium, EN AW 6082 [AlSi1MgMn], i.e. 3.2315
    - Träger: Aluminium, EN AW 5083 [AlMg4.5Mn0.7], i.e. 3.3547
    - Schrauben/Muttern: Edelstahl 1.4301 A2/A4
    - Kontaktpunkte/Auflagen Neutronenleiter: Bronze (CuSn6, 2.1020 CW452K), alt.: Kupfer-Beryllium (CuBe2, 2.1247 CW101C)
    - Bälge: Edelstahl 304 1.4301 (Flansche), Edelstahl 316Ti 1.4571 oder 316L 1.4404 (Balgmaterial)
    - Halter Kammer auf Support: Aluminium, EN AW 5083 [AlMg4.5Mn0.7], i.e. 3.3547
    - Dichtungen: Alle ISO-K und ISO-KF: EPDM
    - Aufnahmen kinematic mounts Träger/Paarung: CuBe auf 1.4122 („Standardlösung“, ideal unter mech. Gesichtspunkten alt.: Bronze auf 1.4301
    - Supports:(„einfacher“) Beton (???)
- Exact neutron guide design
  - (Q) Exact size, cross section, material ?
  - (Q) „Bridge“ / interface to support ?
- In-bunker installation/deinstallation
  - (Q) how to fix system to ground ?
  - (Q) how to release system from crane ?
  - (Q) how to connect flanges (at least downstream to bellows) ?
- Floor interface / grouting plates
- Entrance window size
- Pumping / monitoring of vacuum

Open Issues (cont'd)

- Materials
  - Trying to observe document NOSG-220725475-021017-0820-4.pdf
    - […]
- Exact neutron guide design
    - […]
- In-bunker installation/deinstallation
    - […]
- Floor interface / grouting plates
  - (Q) how to ensure positioning ?
  - (Q) how to compensate/quantify exact "as-is" floor position to nominal pre-set values ?
- Entrance window size
  - (Q) can window size be reduced ?
  - (Q) what is figure of merit / driving requirement ?
  - (Q) window thickness 0.5mm ok ?
- Pumping / monitoring of vacuum
  - (A) -> pumped by downstream sections !?

Thank You for Your Attention

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