JÜLICH
FORSCHUNGSZENTRUM

SKADI

Shielding-Meeting Juelich 03-05.05.17

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Overview

- SKADI Work Packages
- Beam Path
- SKADI Layout and dimensions
- Some Shielding components for SKADI
- Interfaces with ESTIA
- Proposed standard solution for shielding

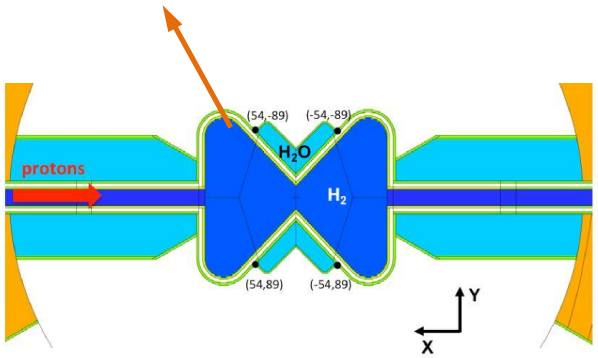
SKADI Work Packages

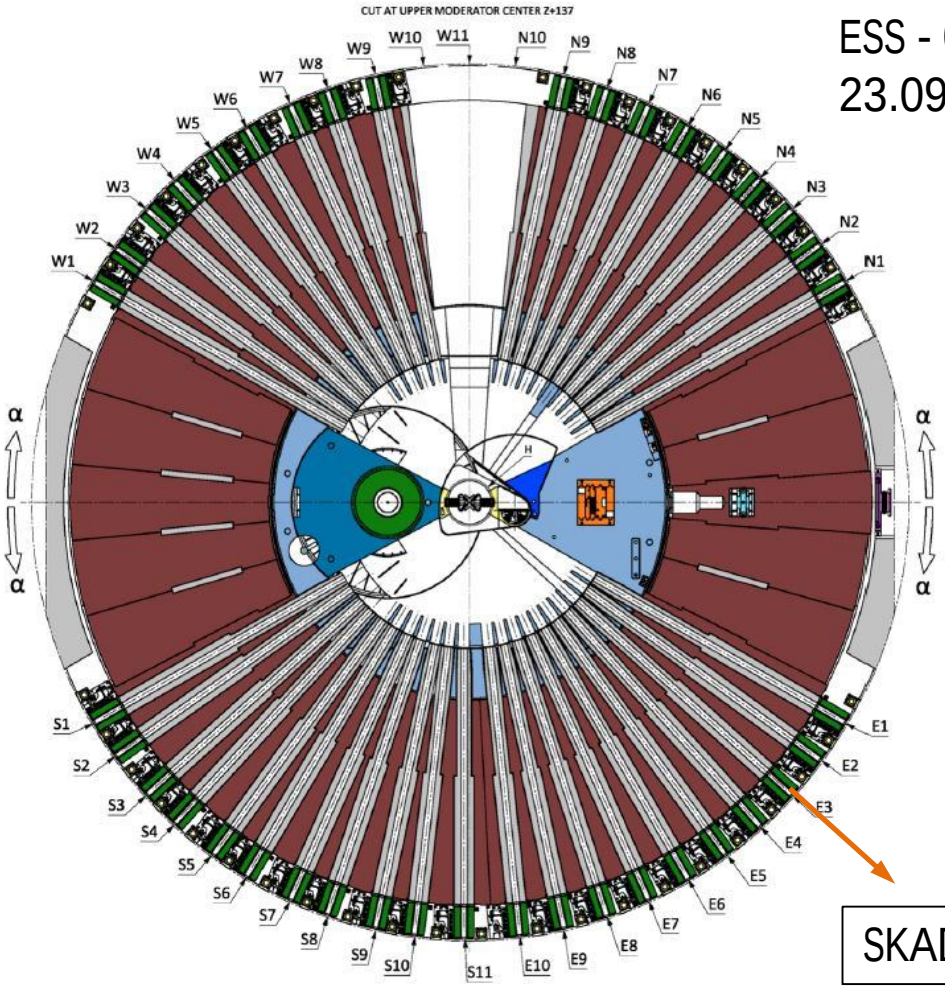
- FZJ and LLB contribute equally to the work and budget for SKADI
- Work packages are assigned to each laboratory.
- Major work packages for FZJ:
  - Beam extraction
  - Heavy shutter
  - Instrument shutter
  - Polarizer, Spin-Flipper
  - Chopper
  - Sample position system with shielding
- Major work packages for LLB:
  - Collimation with VSANS-Option
  - Detector tank with detector rail system
  - Shielding
  - Beam monitors

SKADI Beam Path

ESS - 0068256
23.09.2016

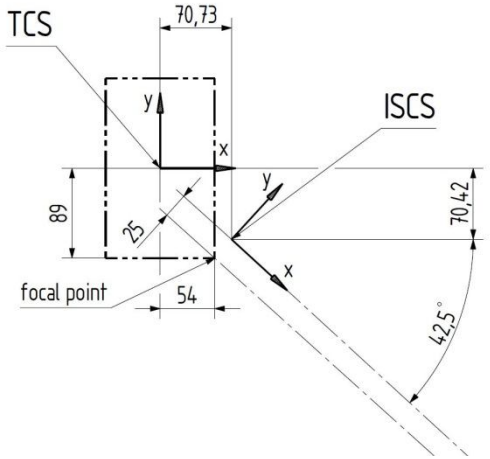
SKADI – E3-Port

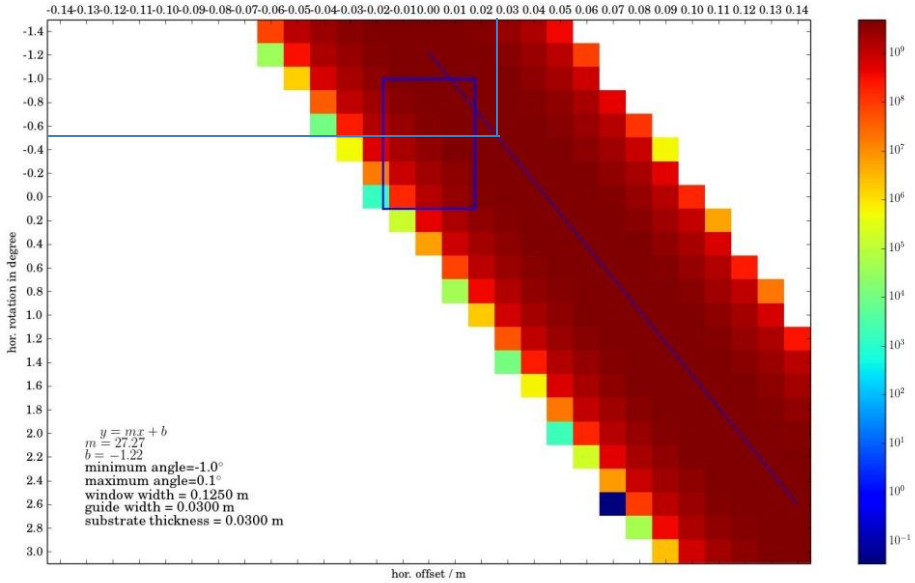




SKADI – E3-Port

SKADI Beam Path

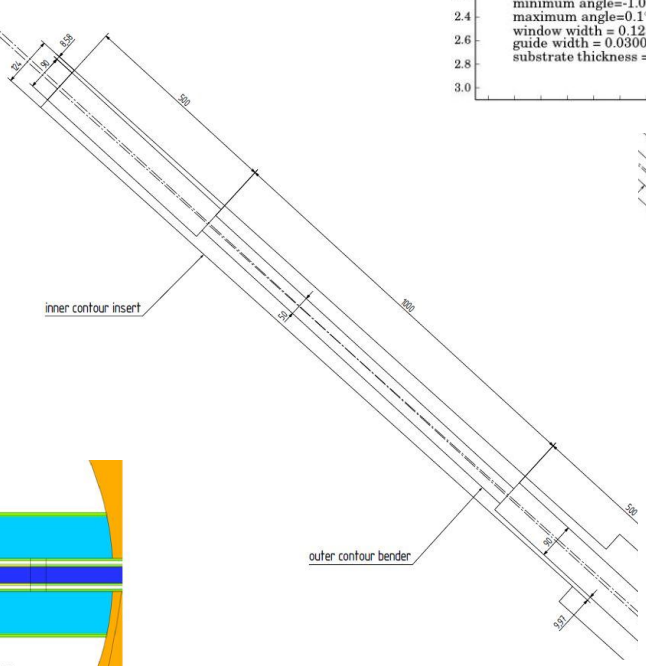


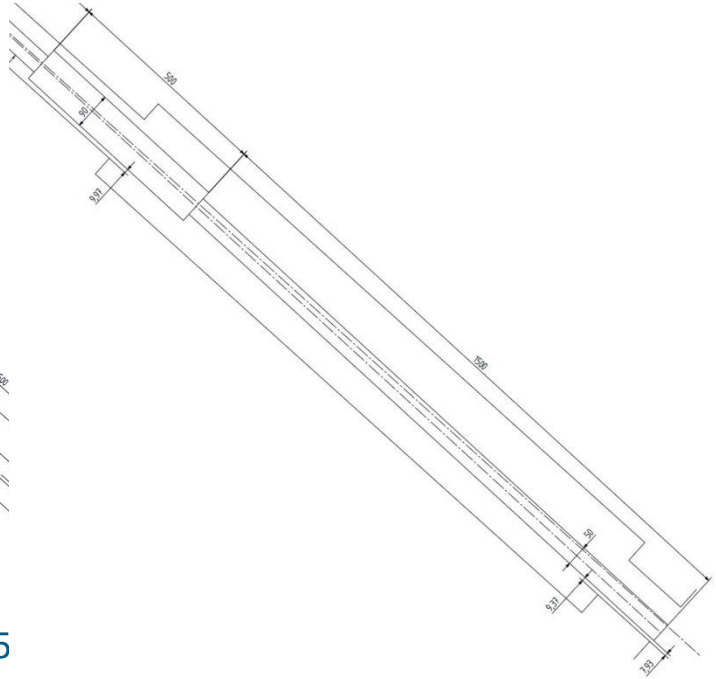


Beam extraction with respect to top moderator coordinates

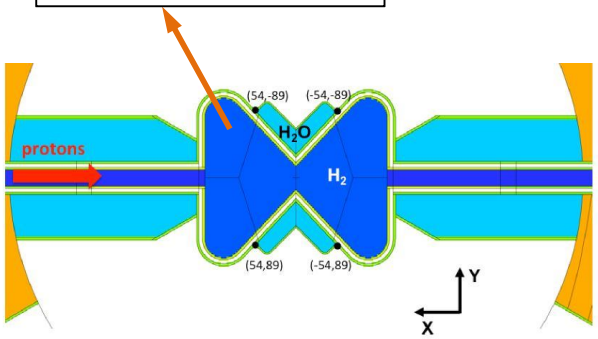
X = 70,7mm
Y = -70,4mm
Z = 137mm

Z Rot = -42,5°

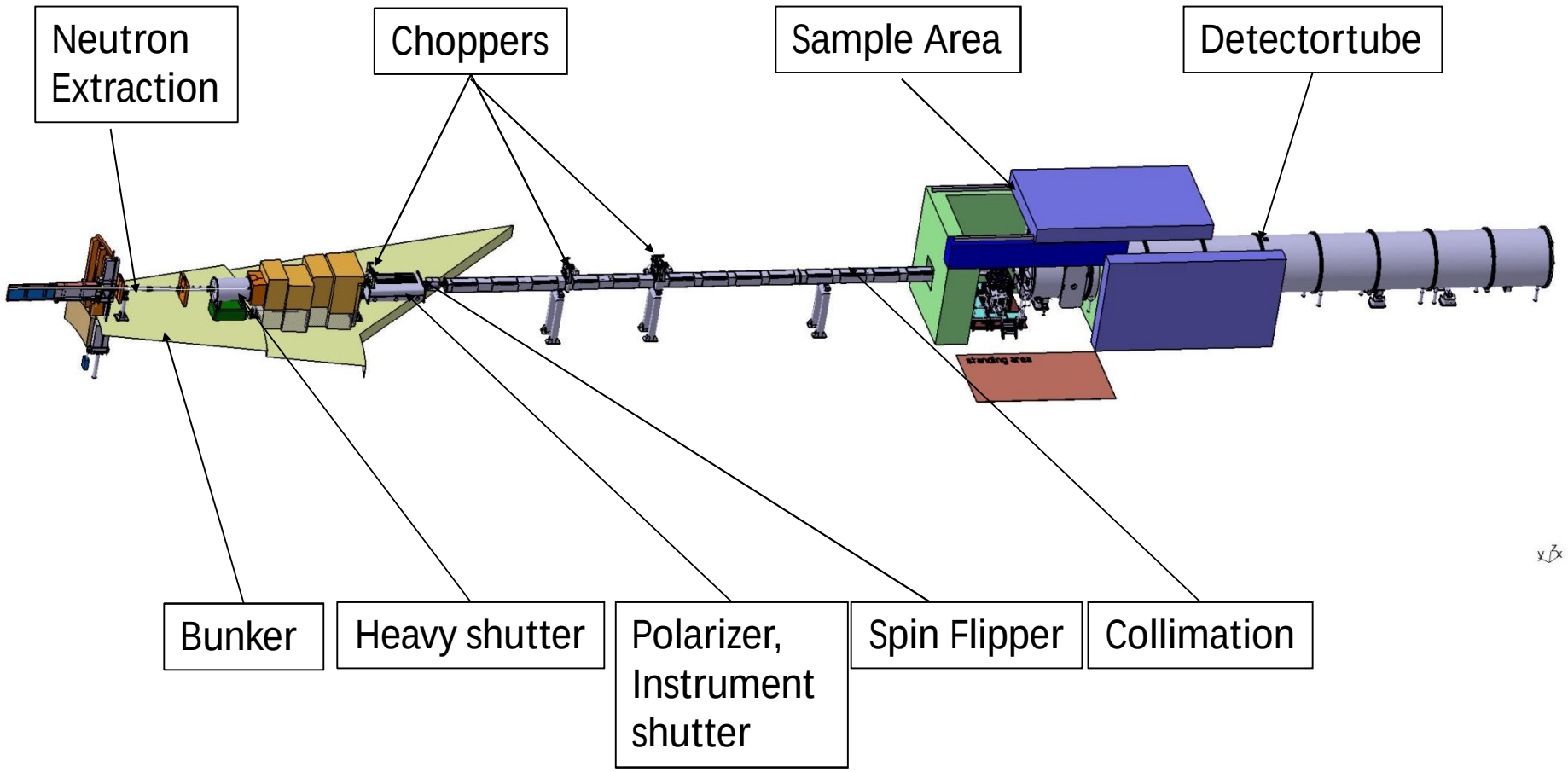




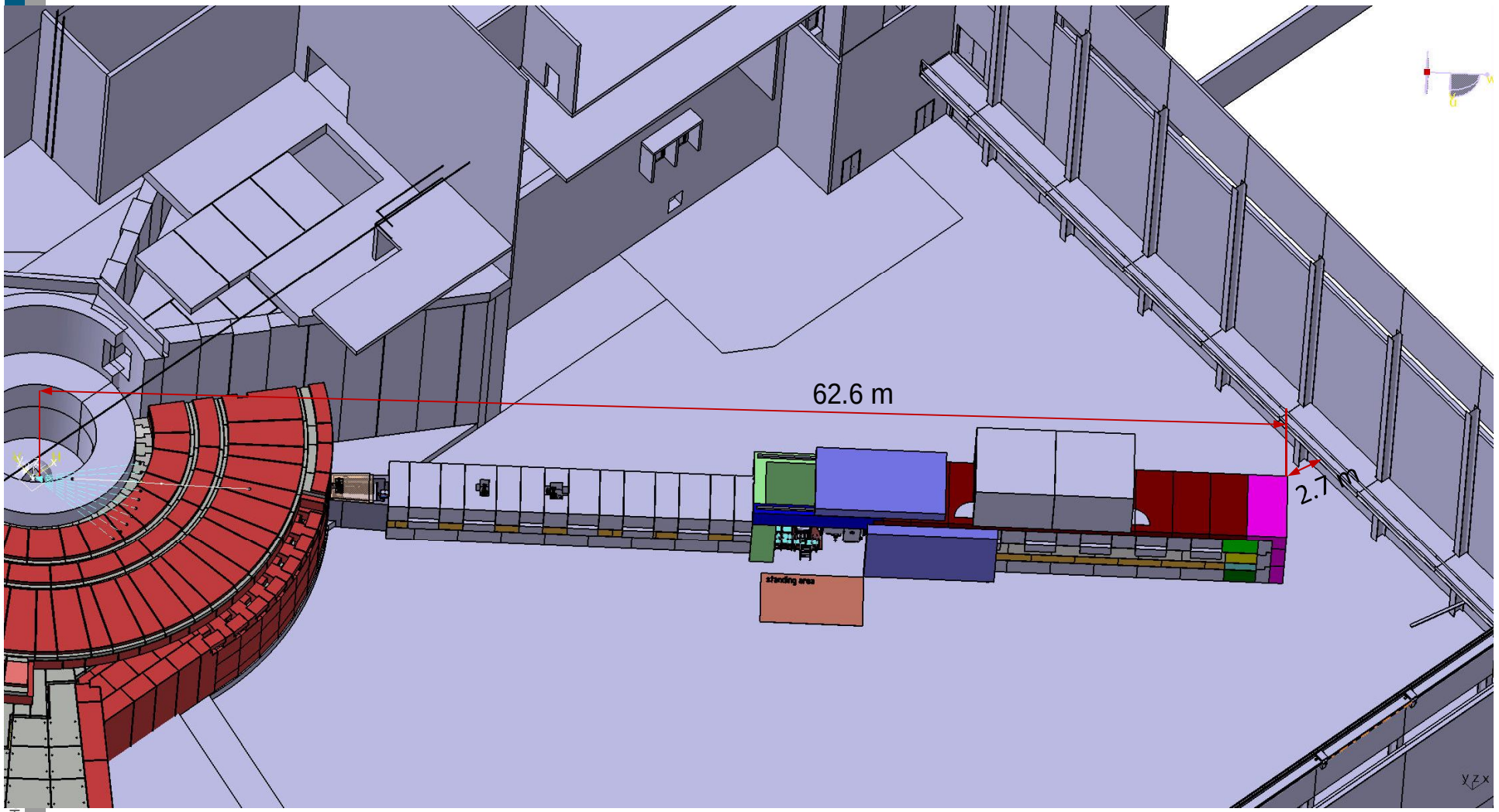
SKADI – E3-Port



SKADI layout

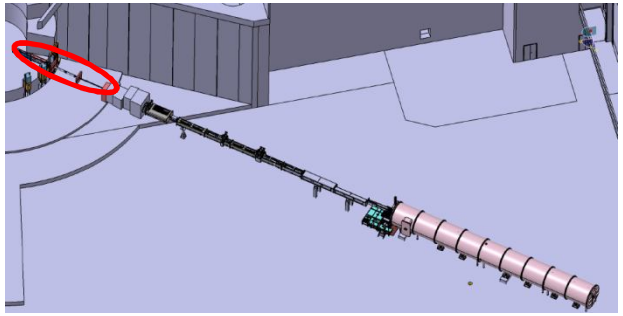


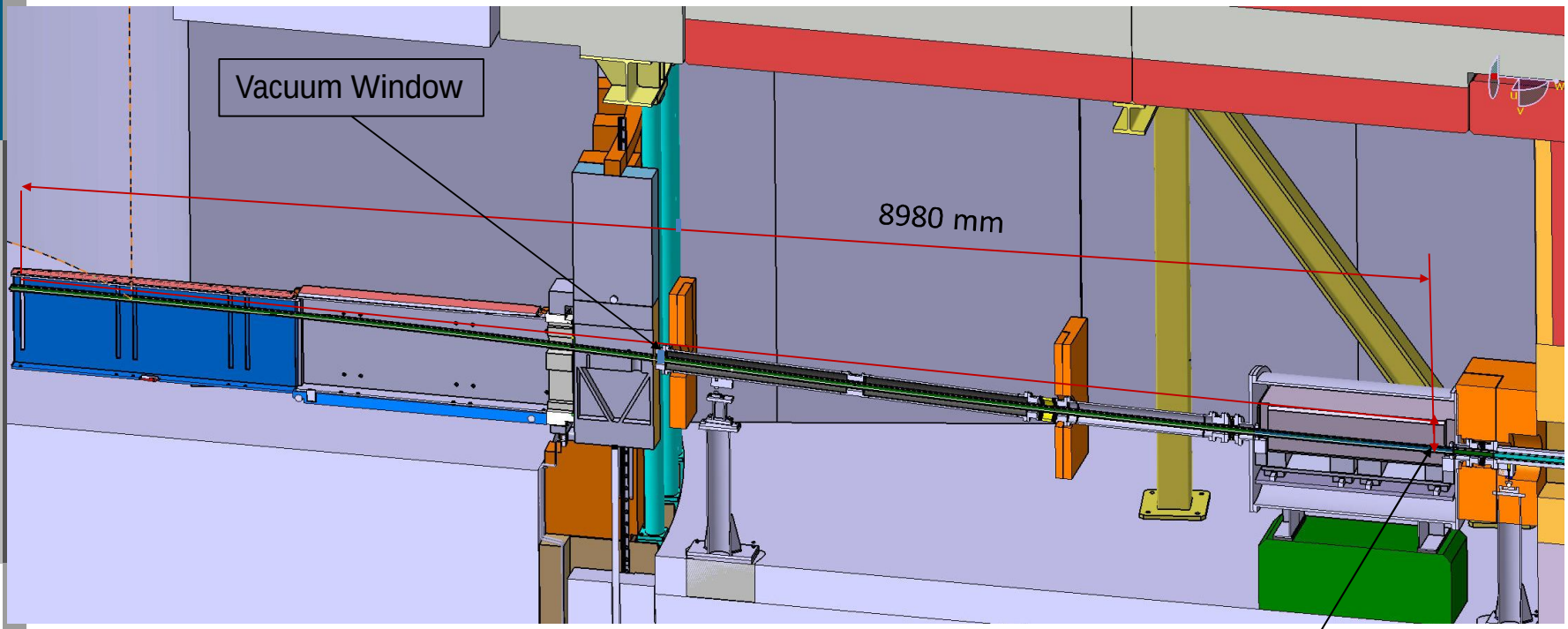
SKADI dimensions
(with Shielding)



ESS Target Building Layout
ESS-0017891

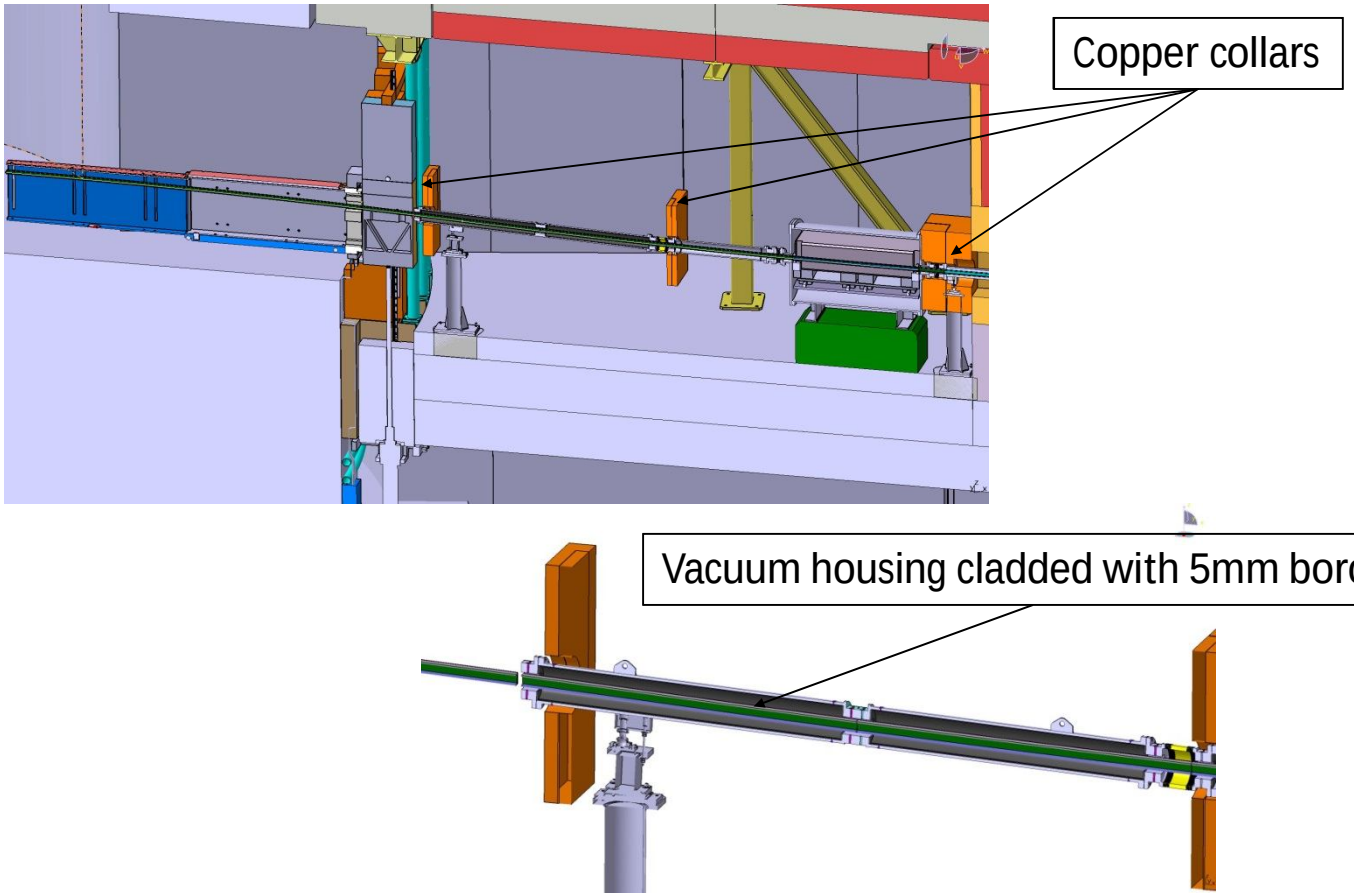
Bender





- Bender integrated in the neutron extraction components
- S-Bender, twice out of line of sight
- Vertical curved metallic neutron guide (Radius ca. 84m, offset 240,2mm, length 8,98m)
- Cross section of neutron guide 30x30mm^2
- Vacuum vessel in the bunker inside (vacuum level 10^{-2} -10^{-3}mbar)

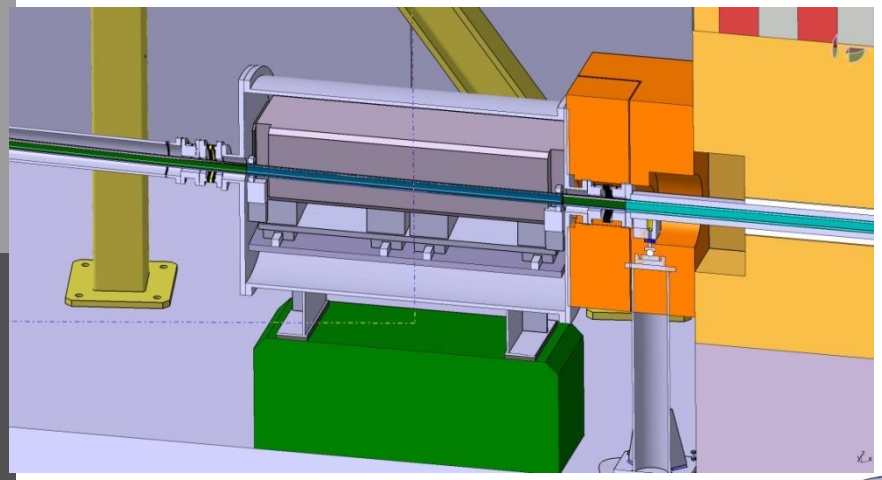
Bender and Shielding

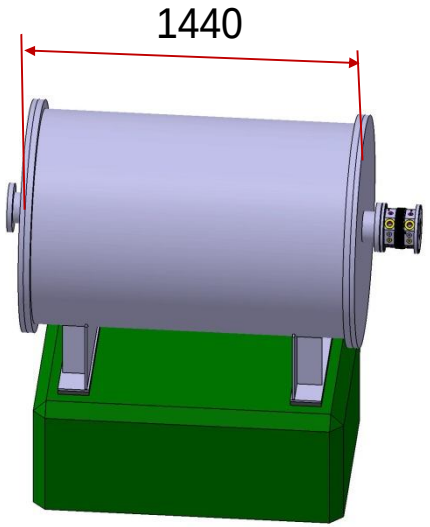


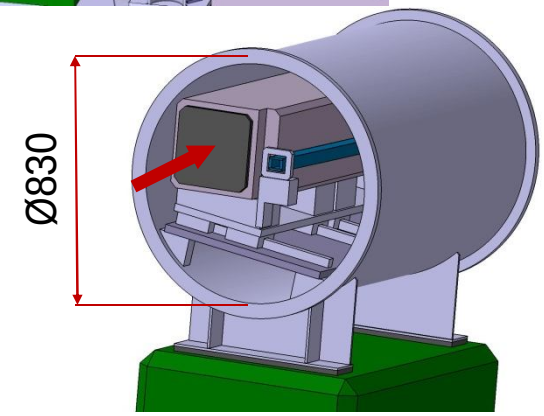
- No biological shielding inside the bunker
- Boron carbide lining to prevent activation of air in the bunker
- Three copper collars to prevent stray neutrons from propagating along the beamline
- Questions: Is this ESS standard? Do we really need the collars?

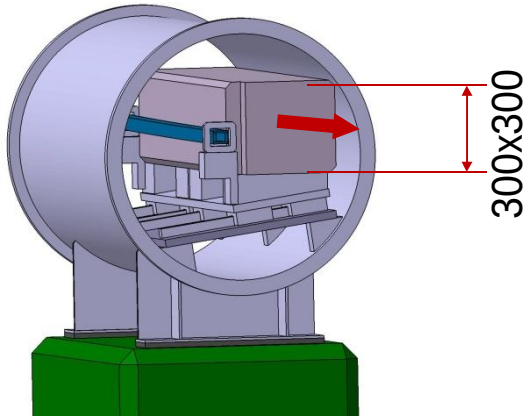
Heavy Shutter

Heavy/Instrument shutter



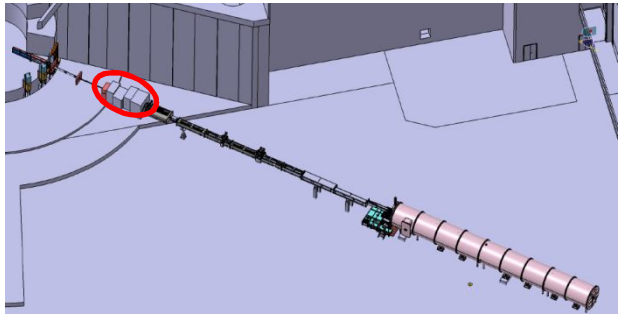


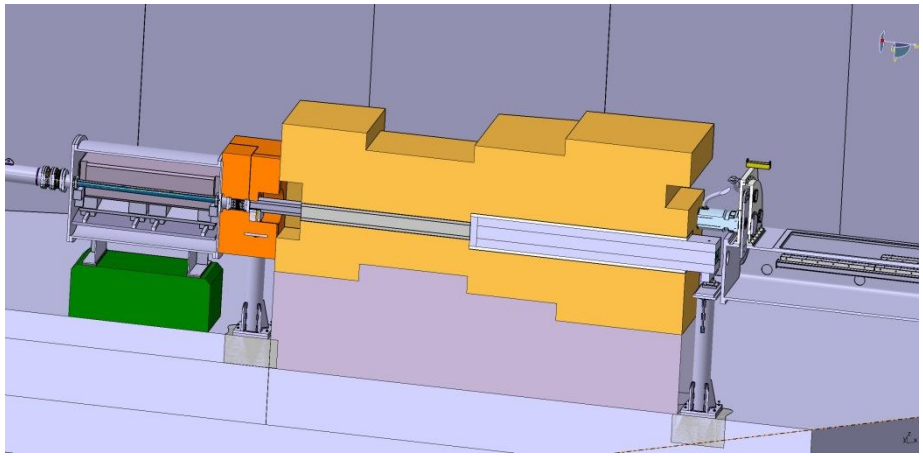


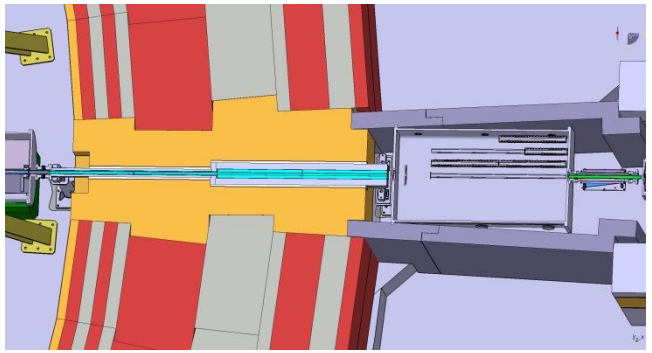


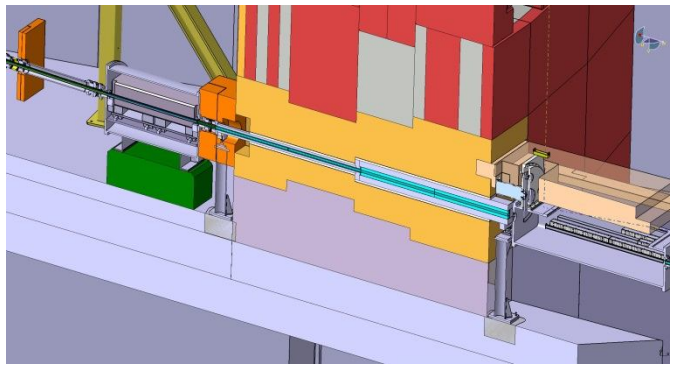
- Shutter moved inside the bunker
- The last piece of bender integrated into the heavy shutter
- Primarily design
- Pneumatic cylinders are proposed as the drive

Feed through bunker wall



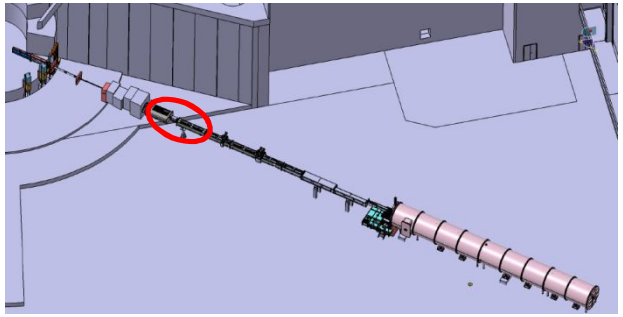


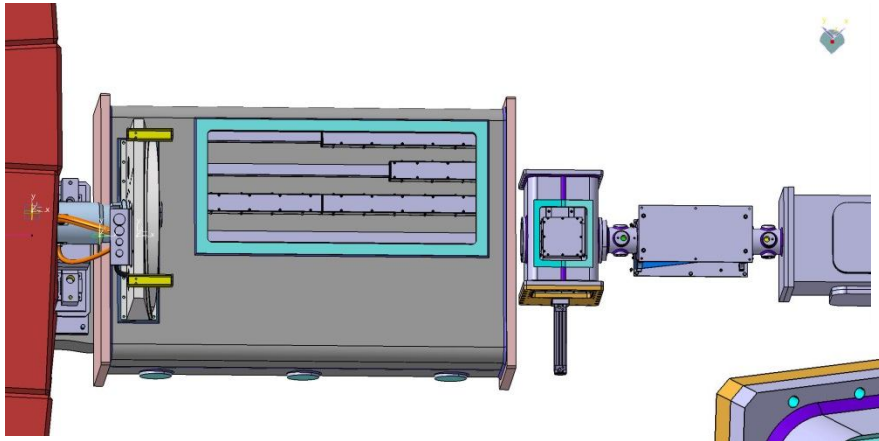


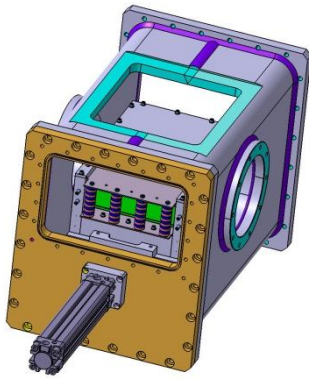


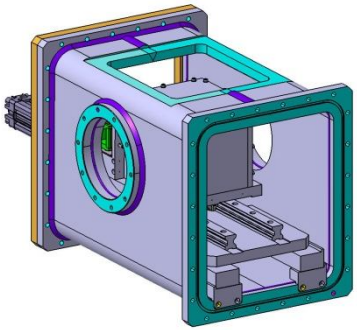
- Feed through bunker wall, system nearly as proposed from ESS
- Neutron housing adjustment outside the wall
- Interface between the copper collar and the bunker wall as well as between the bunker wall and optical cave shielding with chicane.
- First shielding after bunker wall steel walls

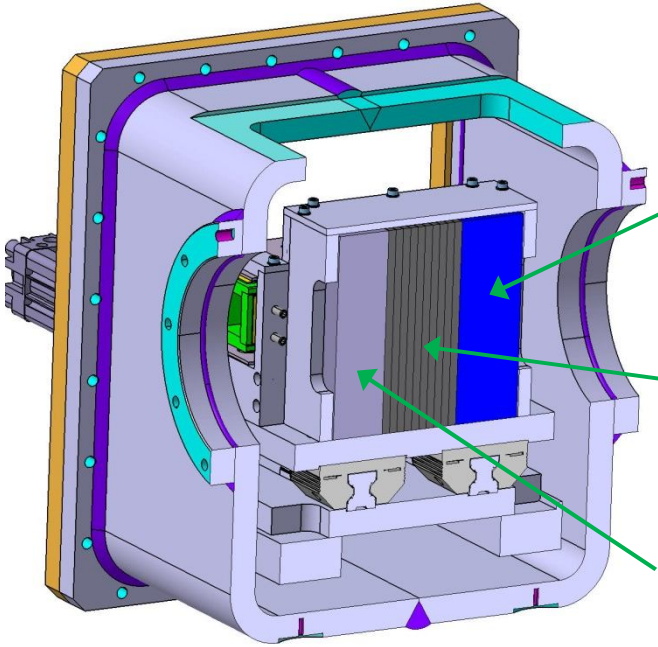
Instrument Shutter





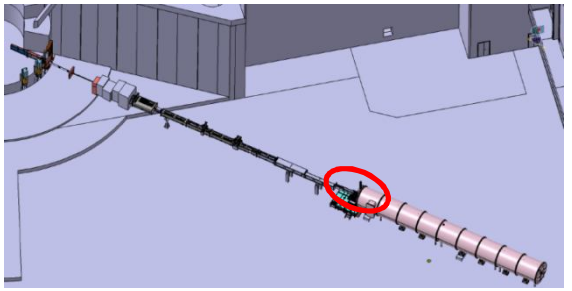


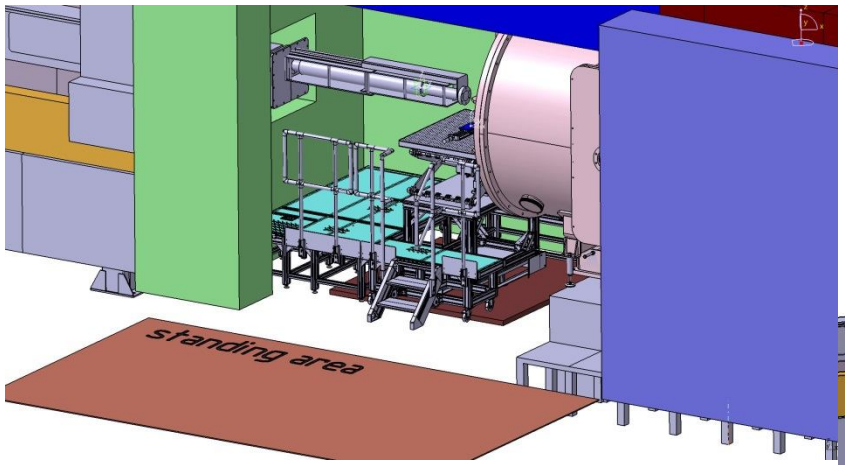


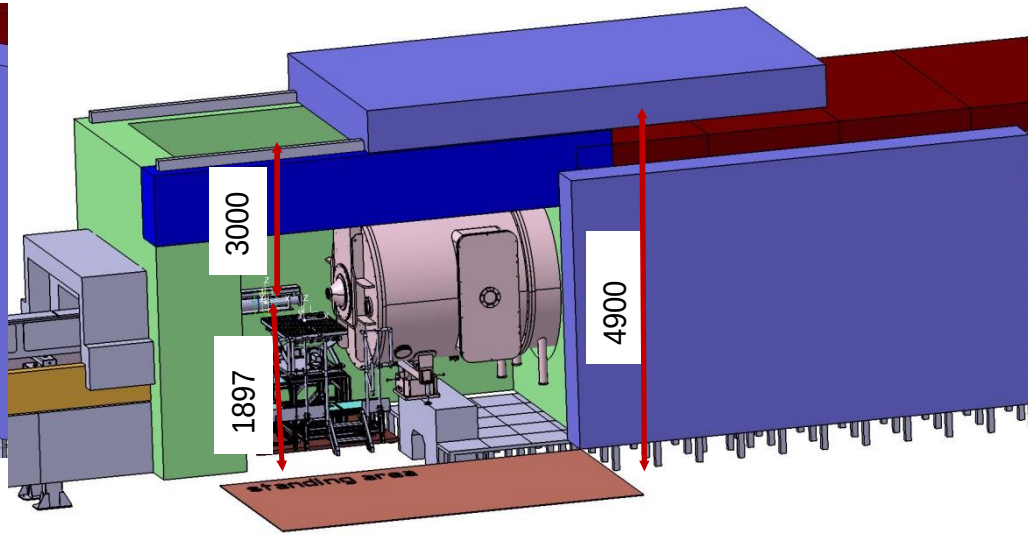


- New Instrument-Shutter required on the TG2-Review for fast beam cut-off for sample changing.
- Heavy shutter only for maintenance work.

Sample cave shielding

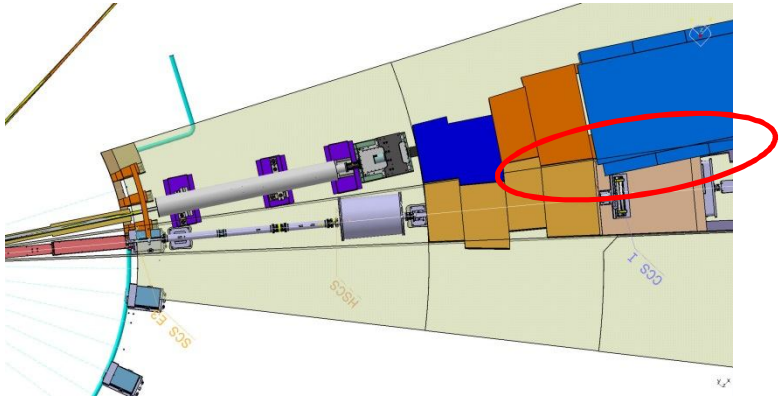




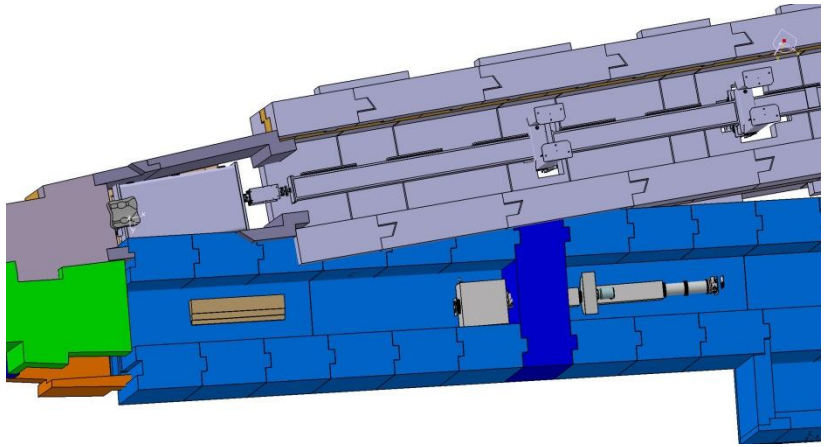


- Concrete shielding (walls and roof) for sample cave consist from 60cm thick walls weight ca.161t
- Additional steel shielding consist from 5cm thick walls weight ca. 36t
- Floor space for shielding 12,2m^2
- Floor loading 16,5t/m^2
- Task by H. Feilbach (JCNS)

Interfaces with ESTIA Bunker Wall



- Top view

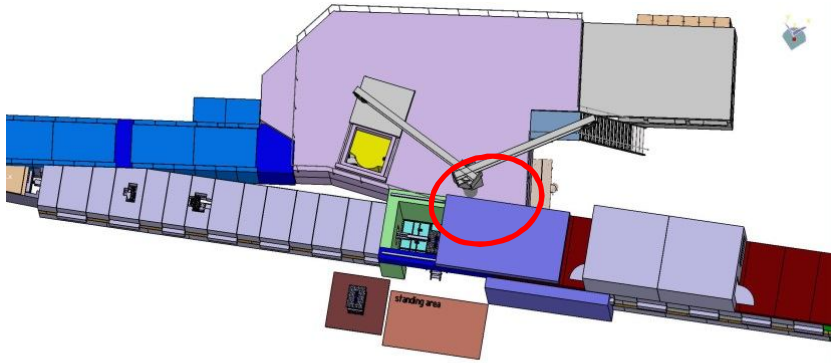


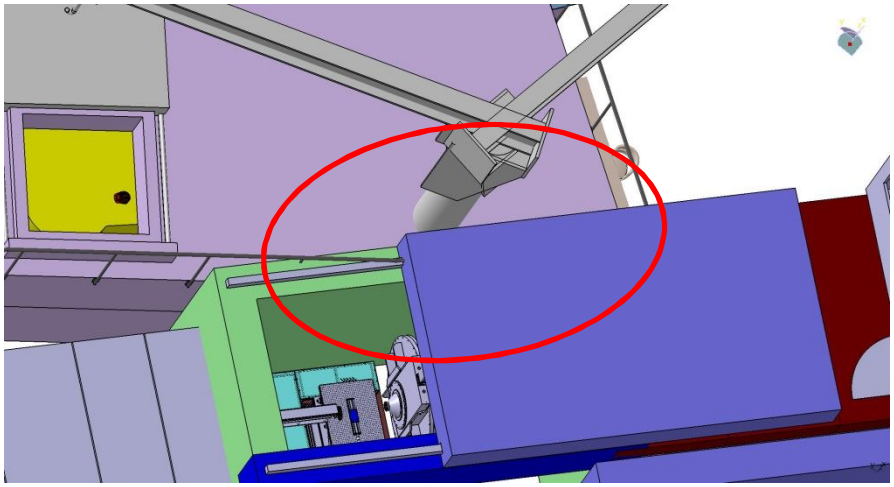
- View from below

We need an agreement with ESTIA

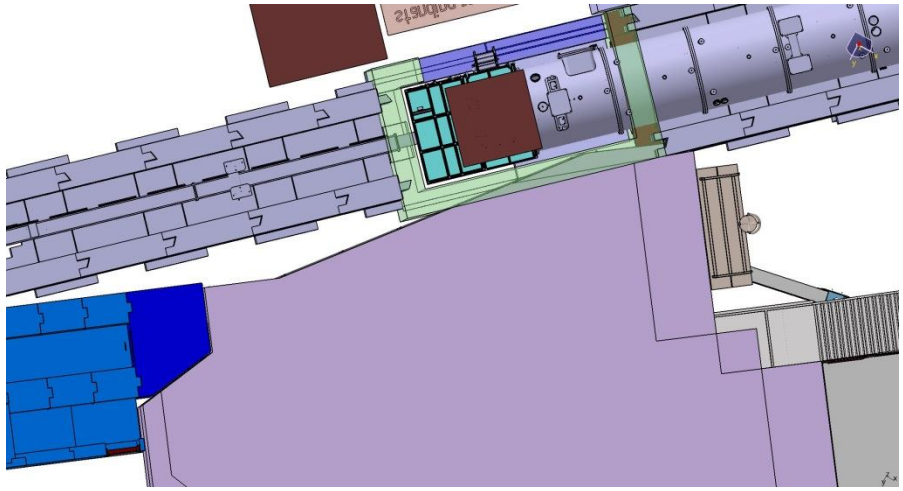
Shielding Meeting Juelich 03-05.05.17

Interfaces with ESTIA
Sample cave area





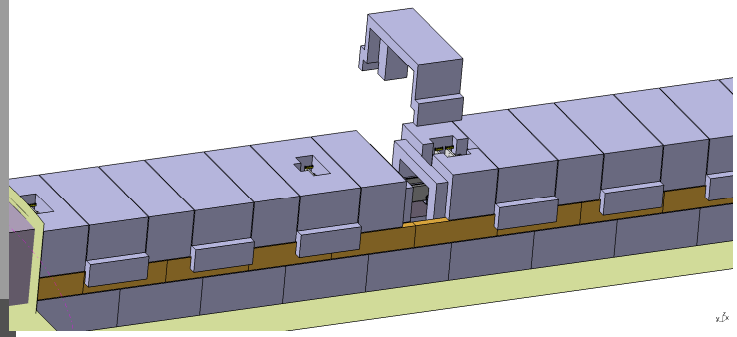
- Top view

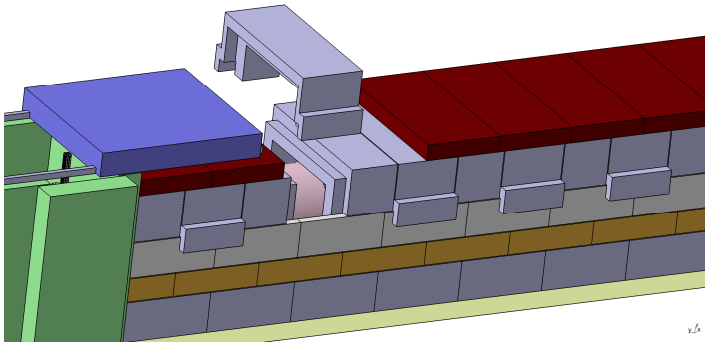


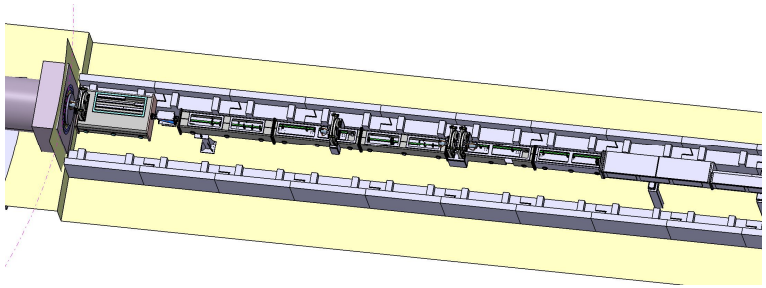
- View from below

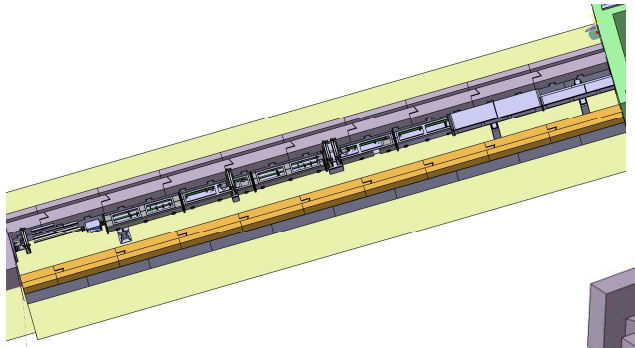
We need an agreement with ESTIA

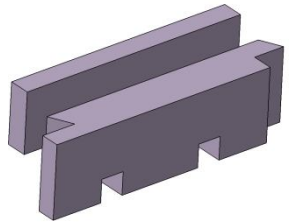
Standard shielding blocks



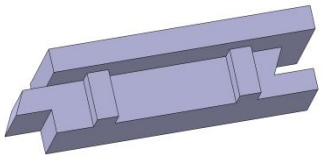








- Postulated standardization of the shielding blocks.
- Very difficult to implement in practice, because every shielding layer up to Top shielding for each Instrument should be to look the same.
- Perhaps this should be specified by the ESS.



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Thank you for your attention