

FCC-EE BOOSTER POSITIONING IN DETECTOR CAVERN

FCC-ee Underground Structure Overview

Integration of FCC-ee Arc Cell

Integration FCC-ee Arc Cell **Alternative**

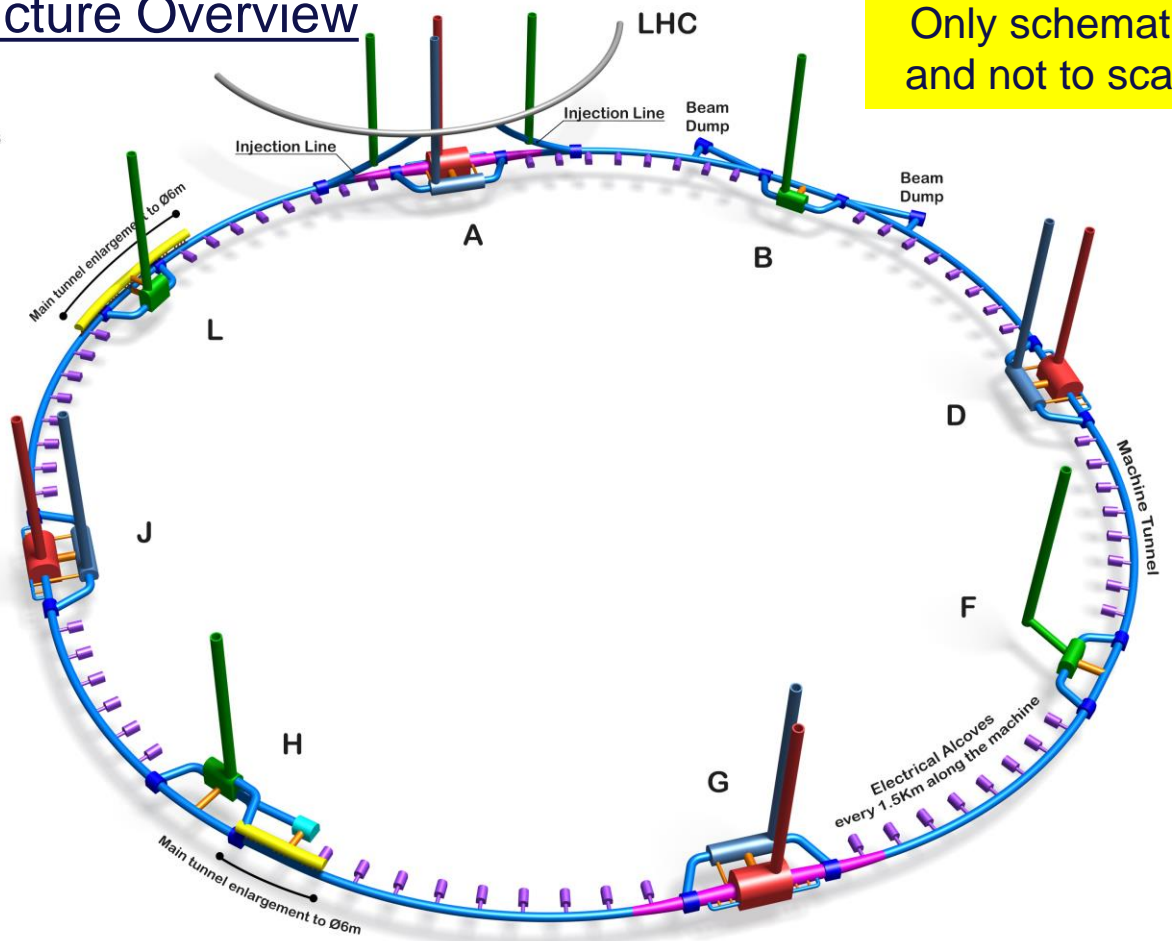
Integration of FCC-ee Beamstrahlung dump

FCC-ee Underground Structure point A

FCC-ee Underground Structure Overview

Only schematic, and not to scale.

- █ FCC Tunnels
- █ Experimental points
- █ Access points
- █ Service caverns
- █ Connection tunnels
- █ Electrical alcoves
- █ Klystron galleries
- █ Tunnel widening
- █ Cryo cavern
- █ LHC

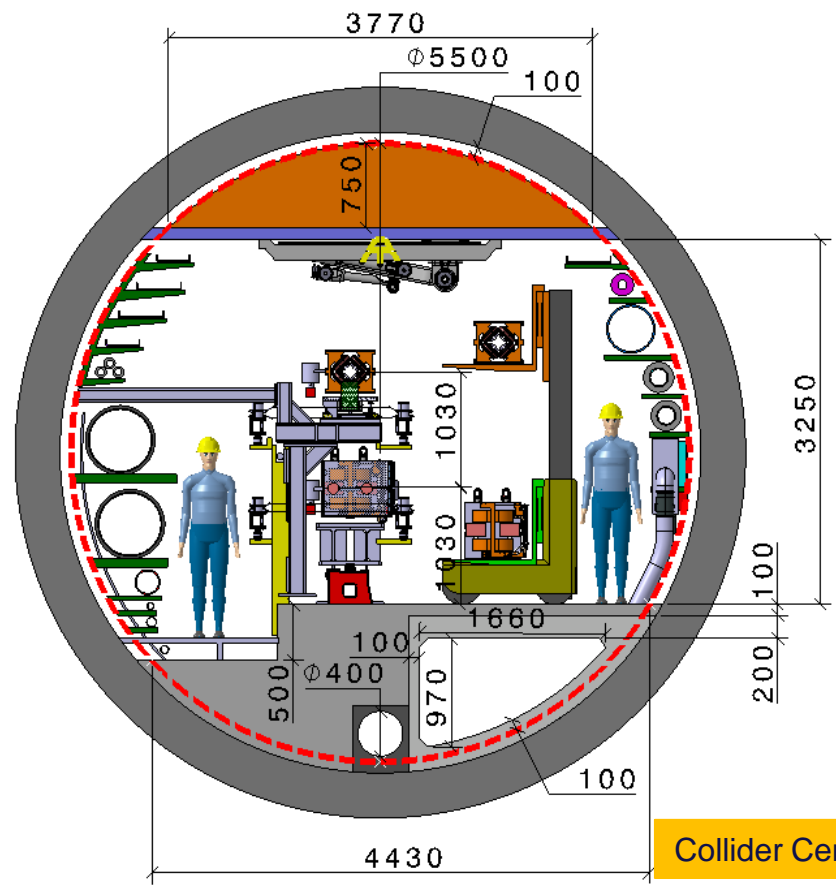


Courtesy A. Navascues Cornago

Integration of FCC-ee Arc Cell

Integration of FCC-ee machine elements (regular arc)

Machine tunnel 5.5m in diameter



Main cross section as for FCC-hh
 Main ring below of booster ring
 Main ring and booster ring 1.03 m distant
 Water distribution changed to DN550 + flange (ø630)

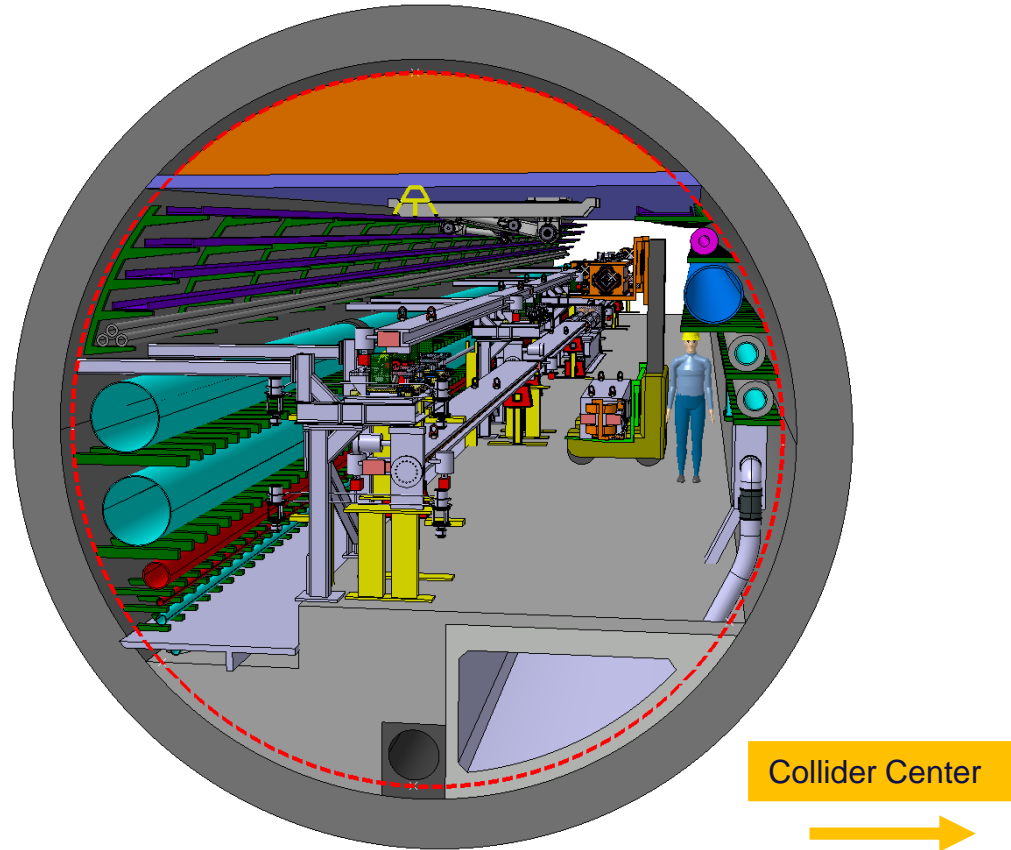
Collider Center



Integration of FCC-ee machine elements (regular arc)

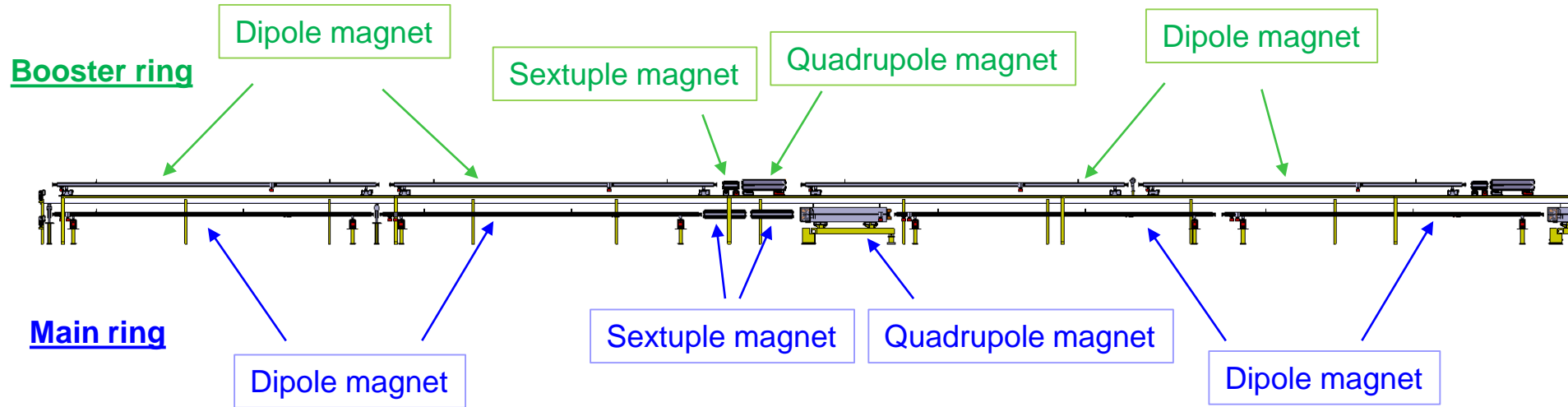
Perspective view

Machine tunnel 5.5m in diameter



Integration of FCC-ee machine elements (regular arc)

Front view

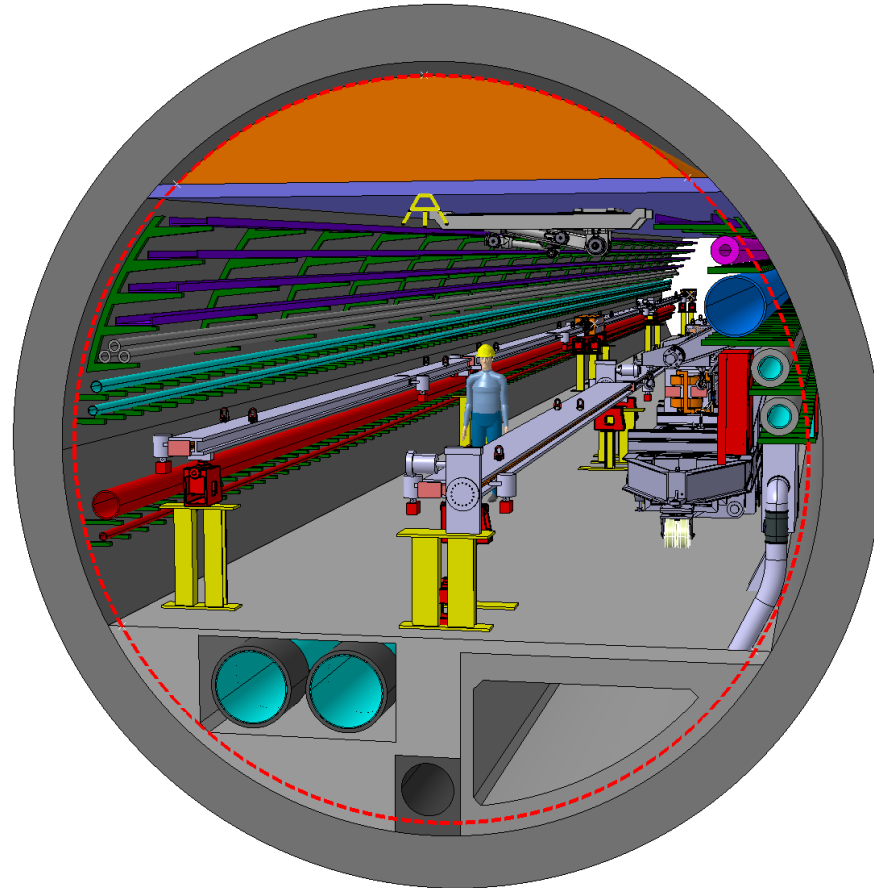


Alternative Integration of FCC-ee Arc Cell

Alternative Integration of FCC-ee machine elements (regular arc)

Perspective view

Machine tunnel 5.5m in diameter



Collider Center

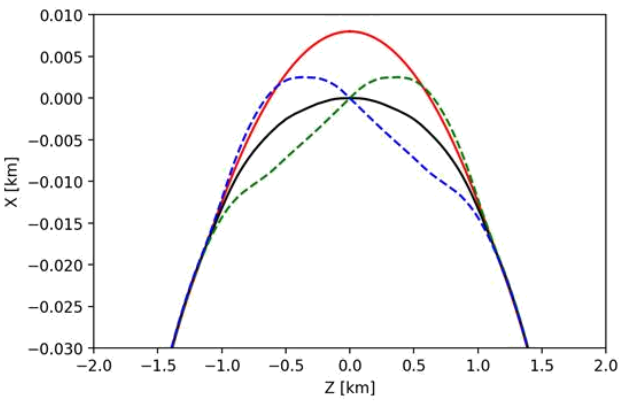
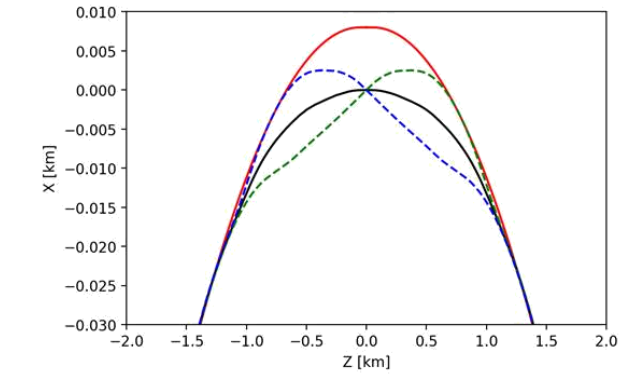


Integration of FCC-ee Beamstrahlung dump

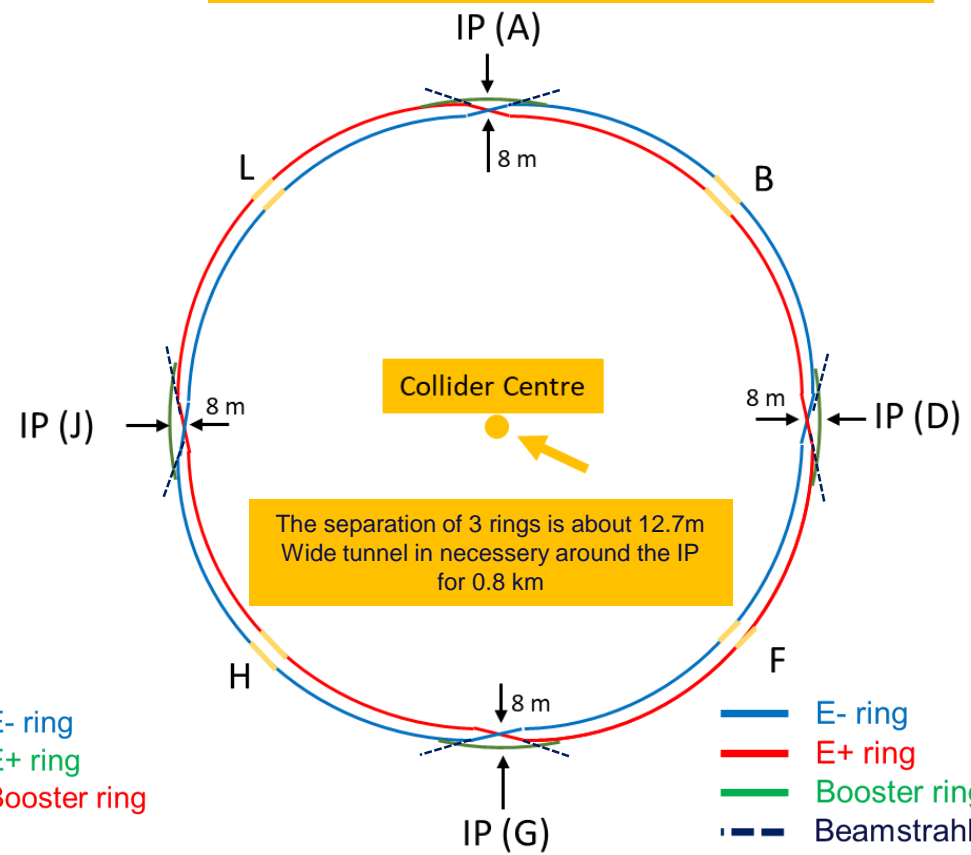
FCC-ee main and booster rings Layout

Two different trajectories for booster ring

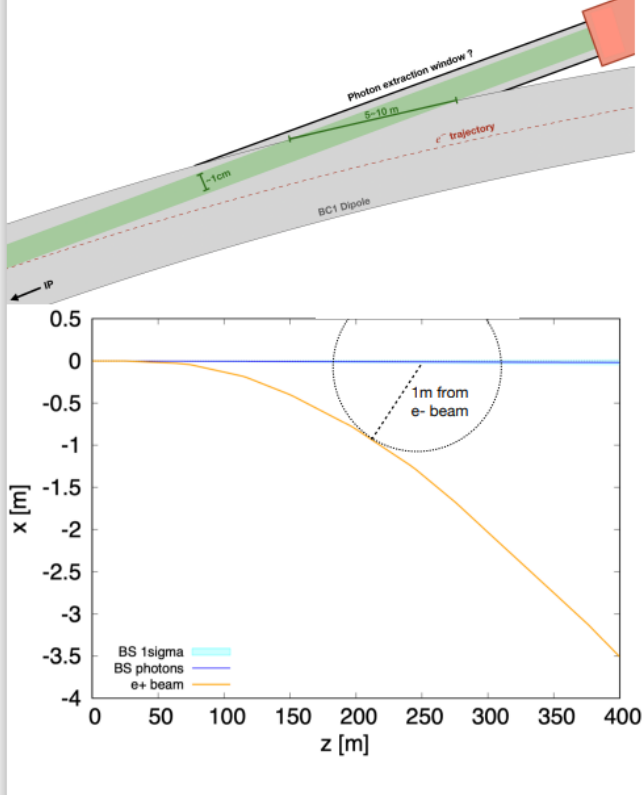
Courtesy K. Oide/ A. Chance



- E- ring
- E+ ring
- Booster ring



- E- ring
- E+ ring
- Booster ring
- - - Beamstrahlung Dump



Beam dump for Beamstrahlung photons

Due to the very high power $O(100kW)$ it is necessary to have a **beam dump** for the beamstrahlung photons.

Several constraints like the long **extraction line** window, the **distance** of the dump from the beam pipe, and the **placement into the cavern** are all currently under study .

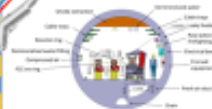
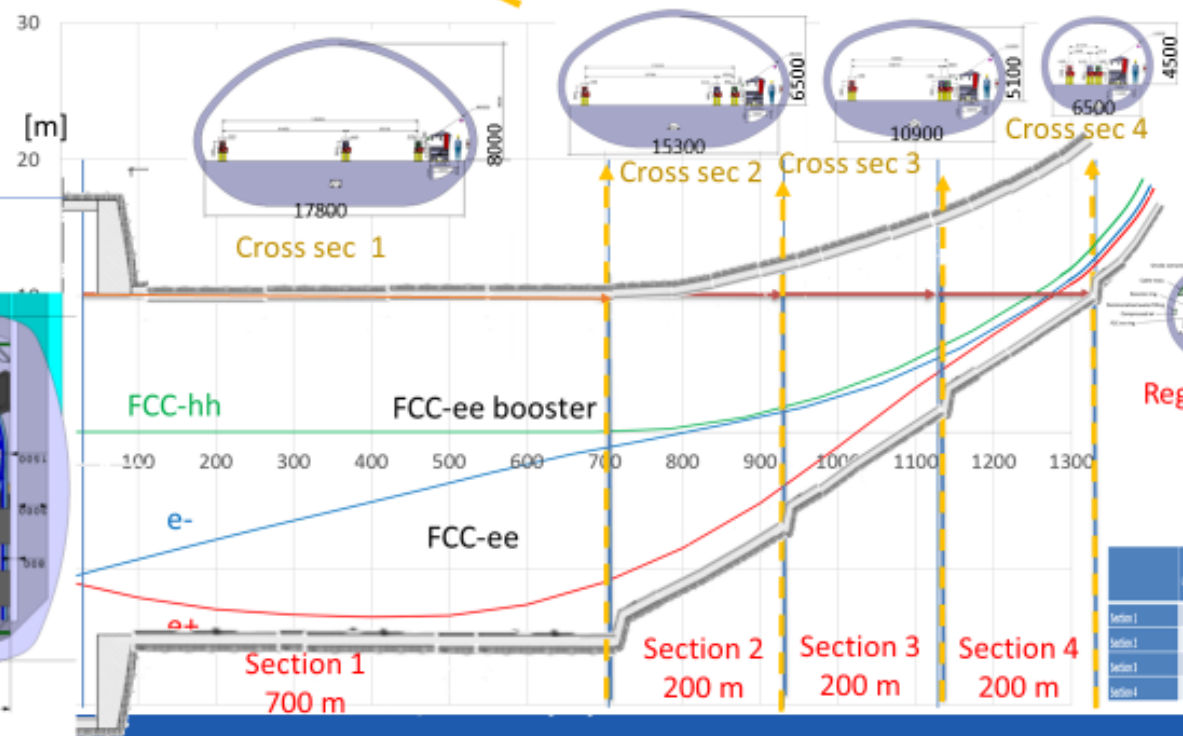
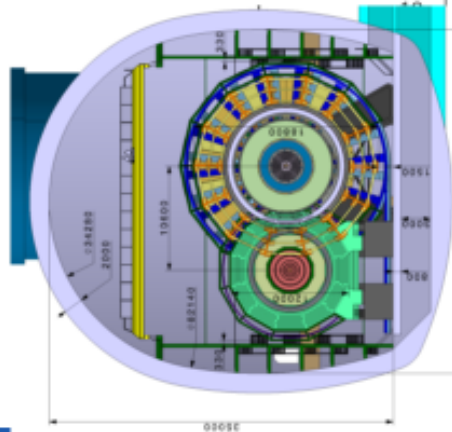
Also the possibility to have an **instrumented beam dump** to measure properties of the colliding beams at the IP is under investigation.



Collider Centre

FCC-ee enlargement

Experiment Cavern



Regular arc

	length (m)	regular arc length (m)
Section 1	700	233
Section 2	200	11
Section 3	200	18
Section 4	200	21

arc →



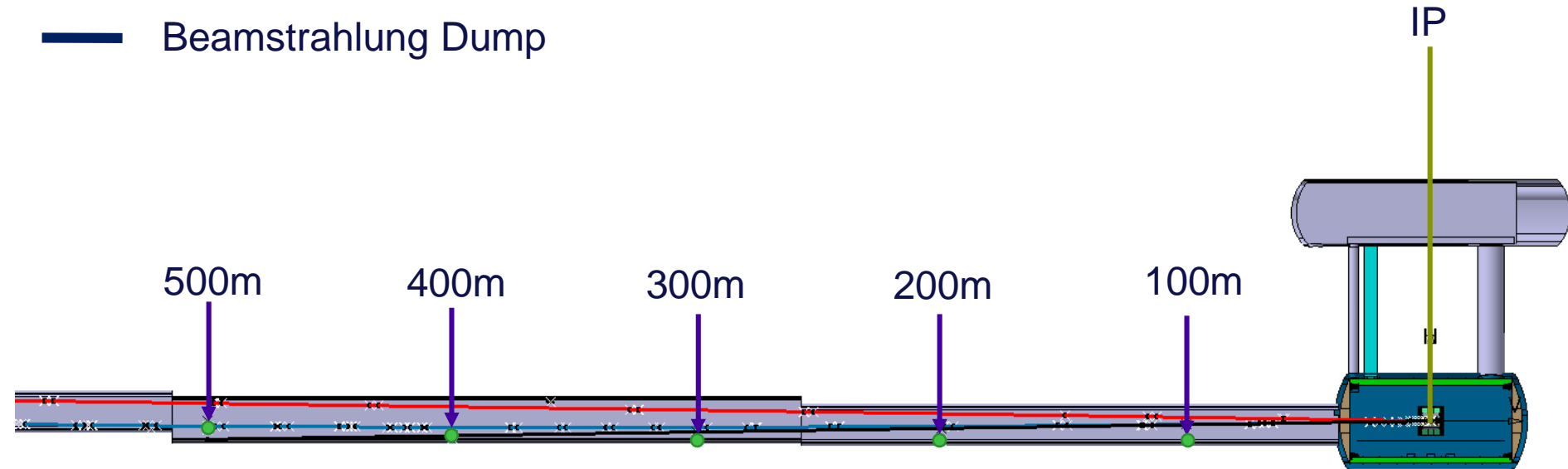
Future Circular Collider Study
 F. Valchkova-Georgieva
 FCC-ee R&D and Technology Meeting, 27.5.2021

Interaction point

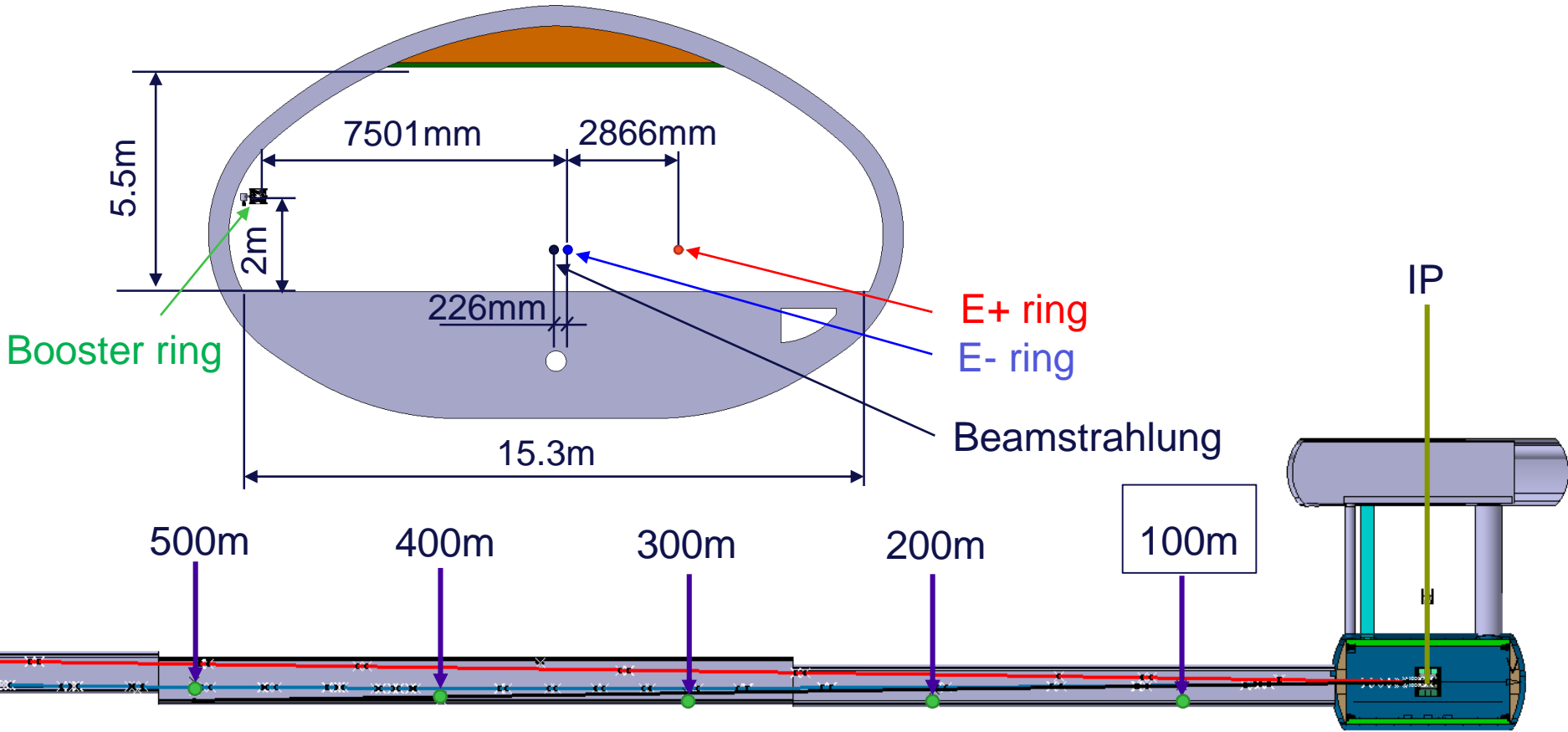
Data: K. Oide (FCC-ee), A. Langner (FCC-hh = FCC-ee booster); enlargement steps: M. J. Stuart

FCC-ee beamstrahlung dump integration at point A

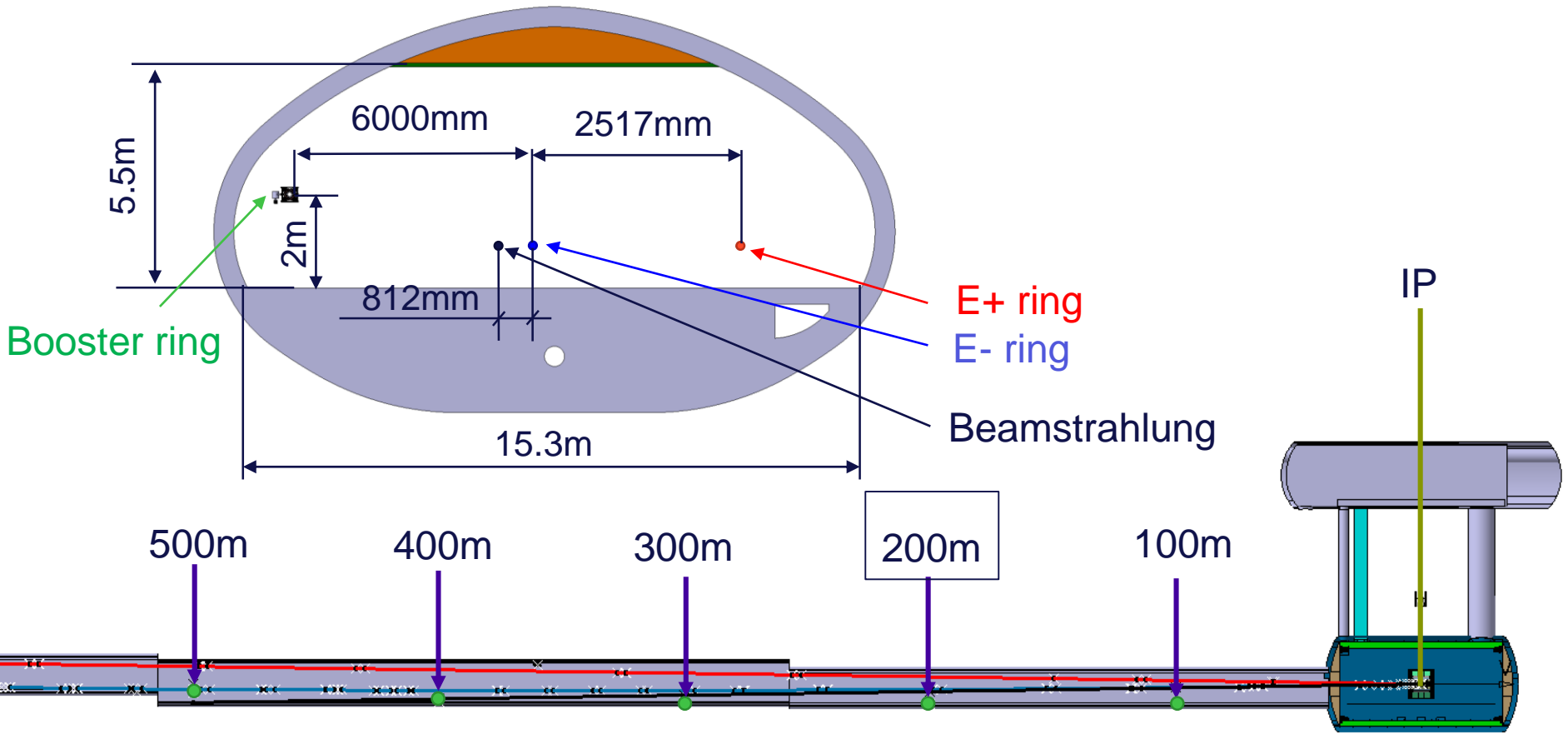
- E- ring
- E+ ring
- Booster ring
- Beamstrahlung Dump



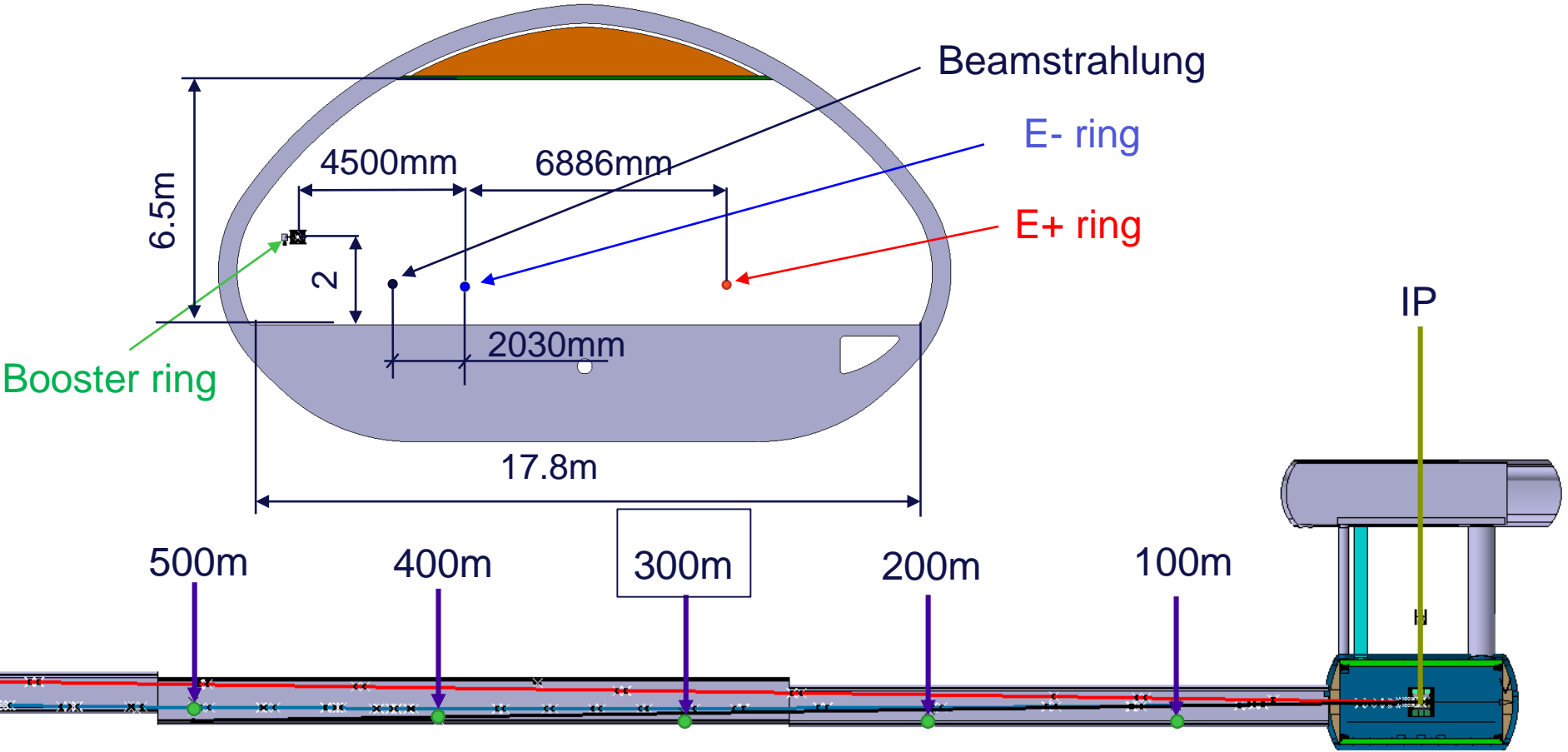
FCC-ee beamstrahlung dump integration at point A



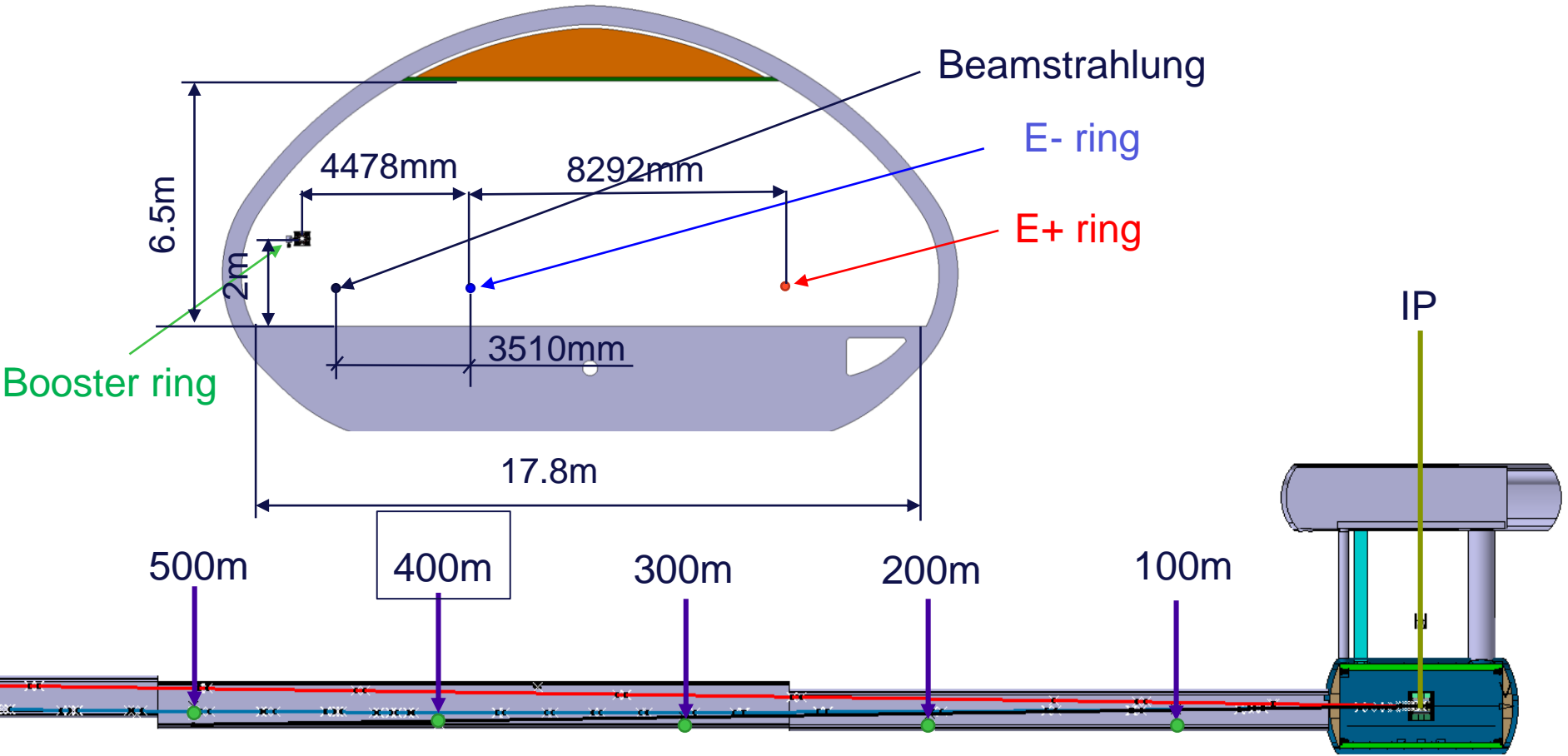
FCC-ee beamstrahlung dump integration at point A



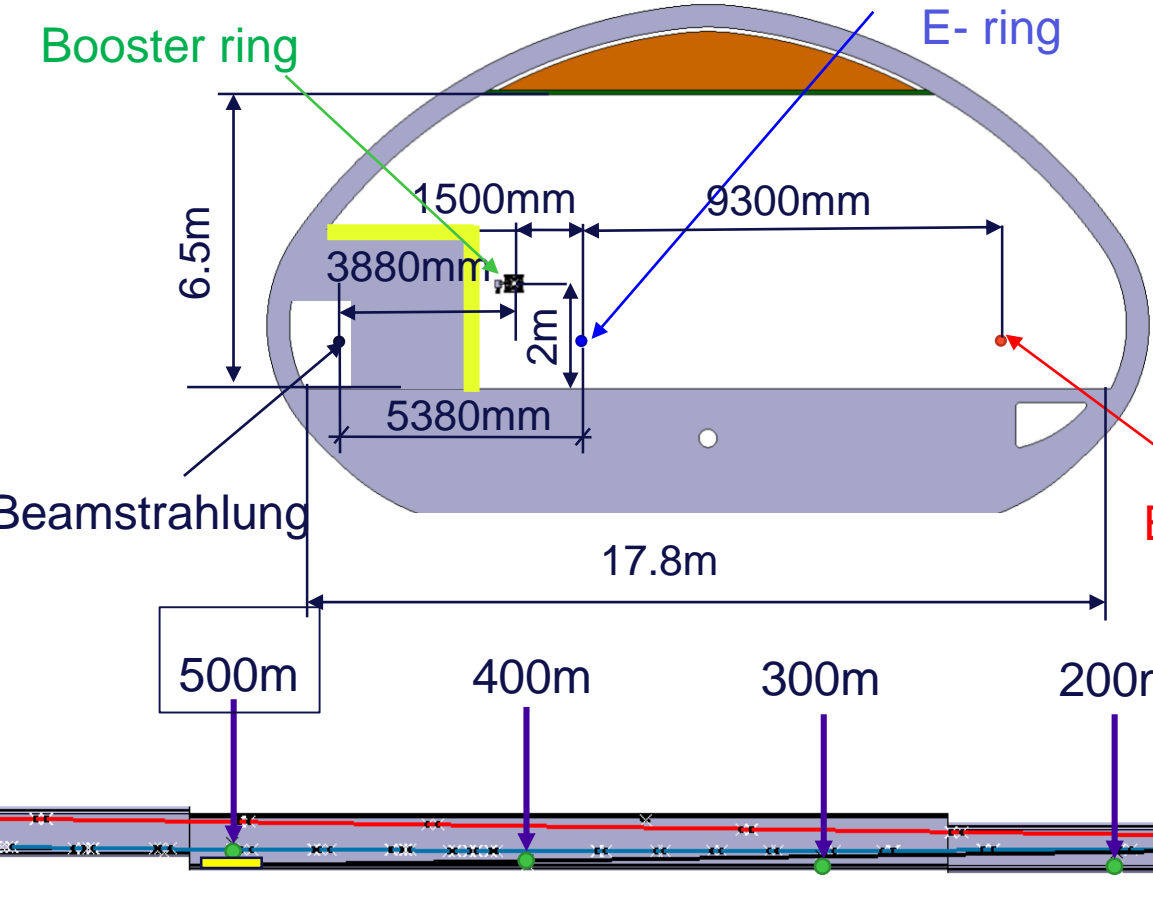
FCC-ee beamstrahlung dump integration at point A



FCC-ee beamstrahlung dump integration at point A



FCC-ee beamstrahlung dump integration at point A



Shielding considerations

Dump cores need to be shielded:

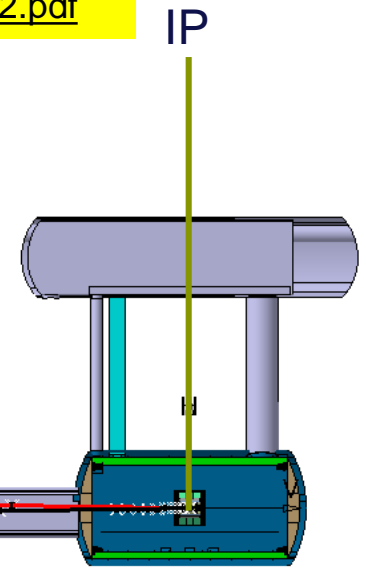
- The shielding shall mitigate instantaneous and cumulative radiation effects in nearby equipment and ensure radiation protection of personnel during shutdowns/technical stops

Equipment protection:

https://indico.cern.ch/event/1165640/contributions/4912773/attachments/2461229/4219826/FCCeeBeamstrahlungDump_13062022.pdf

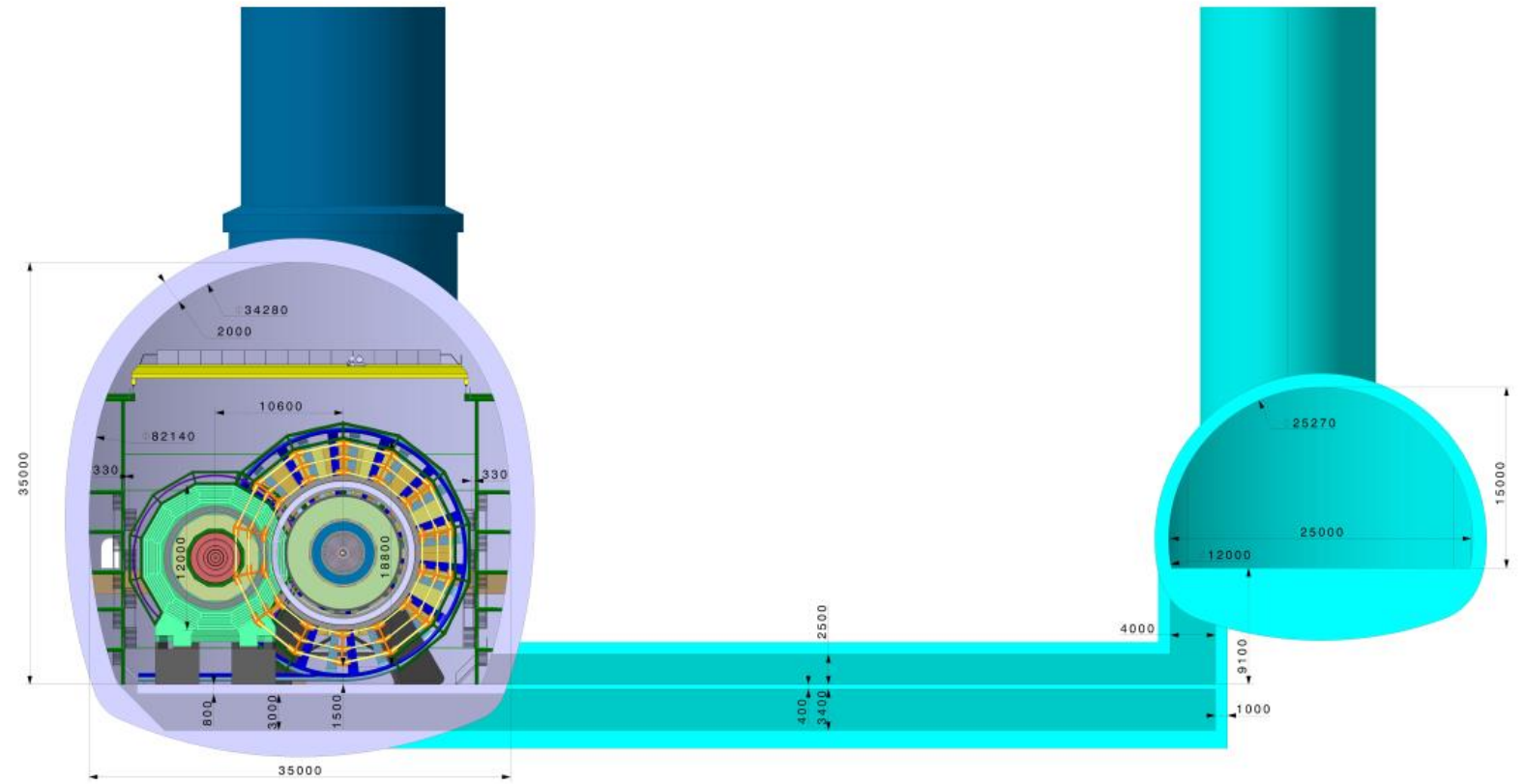
SPS beam dump, 450 GeV protons (designed for 300kW)

Shielding



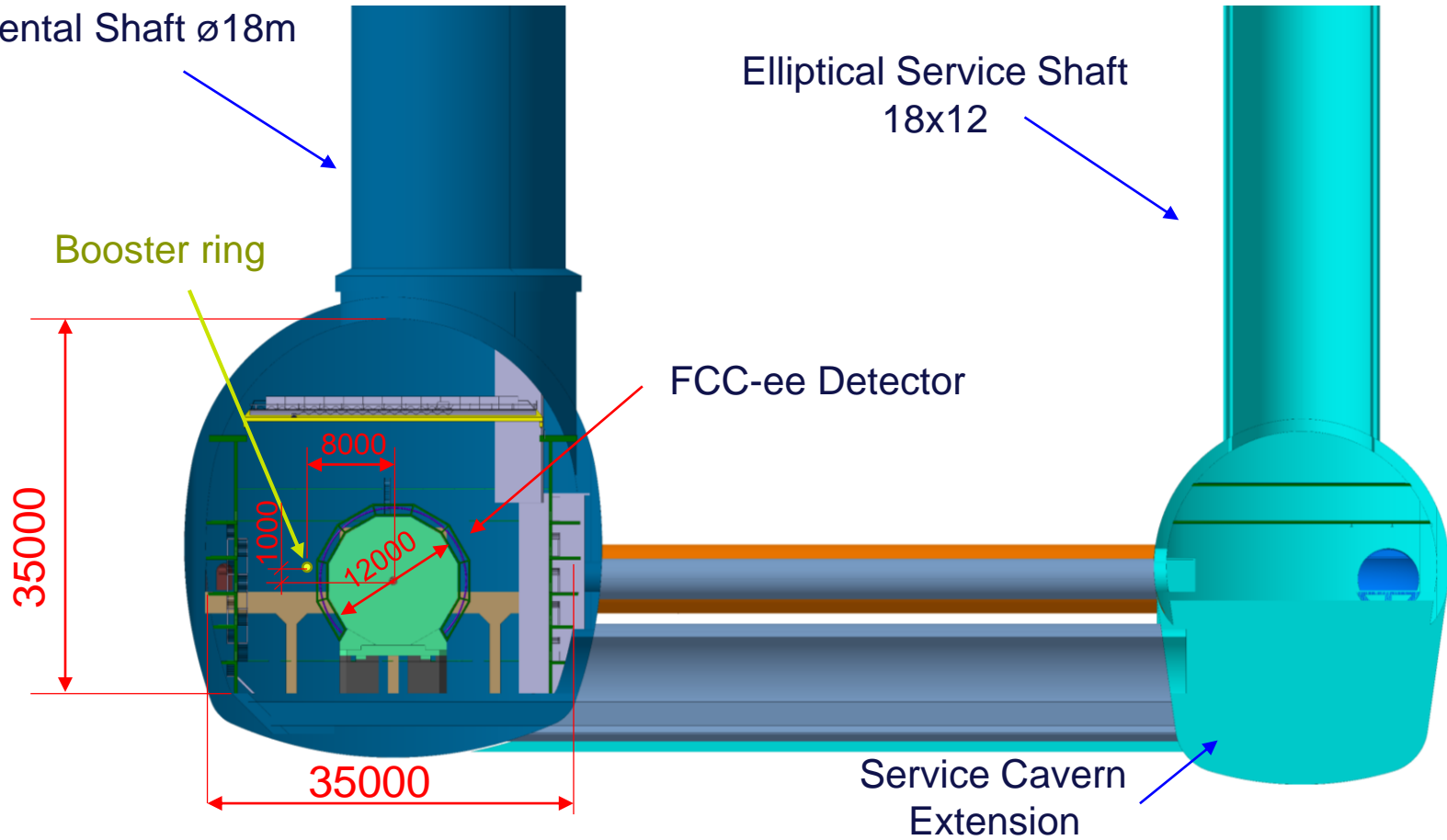
FCC-ee Underground Structure point A

FCC Experiment Underground Structure CDR version

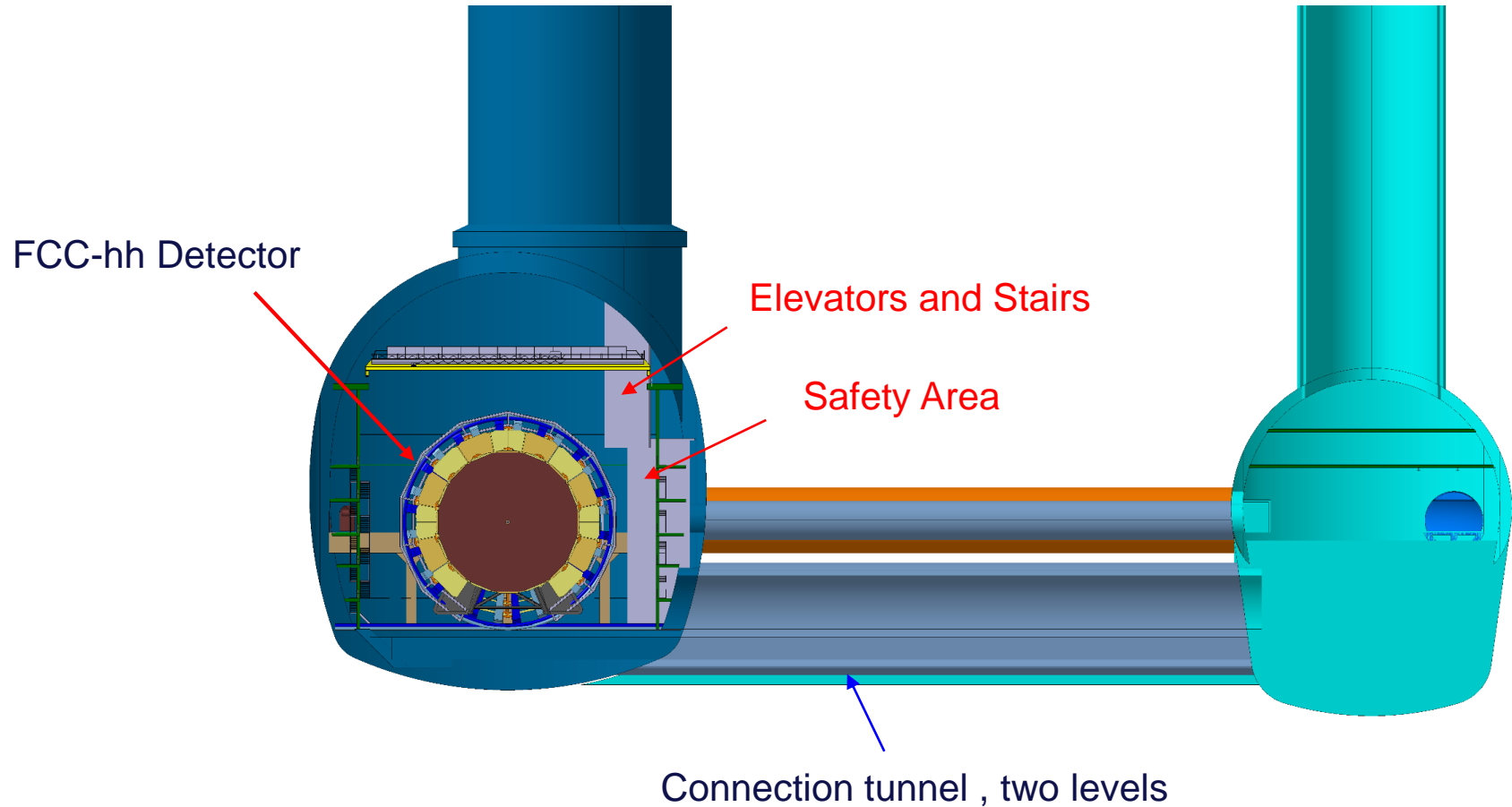


FCC Experiment Underground Structure version 2022

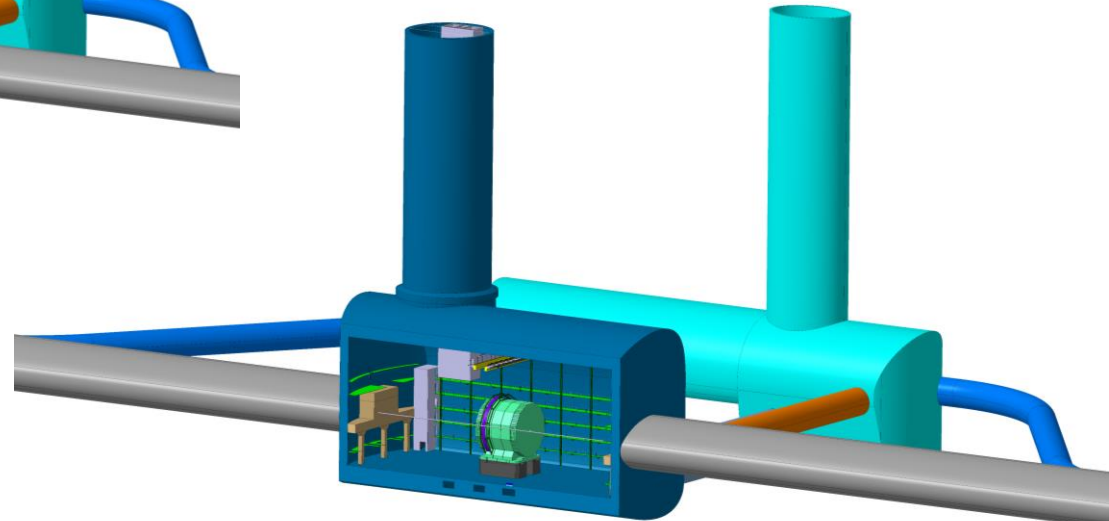
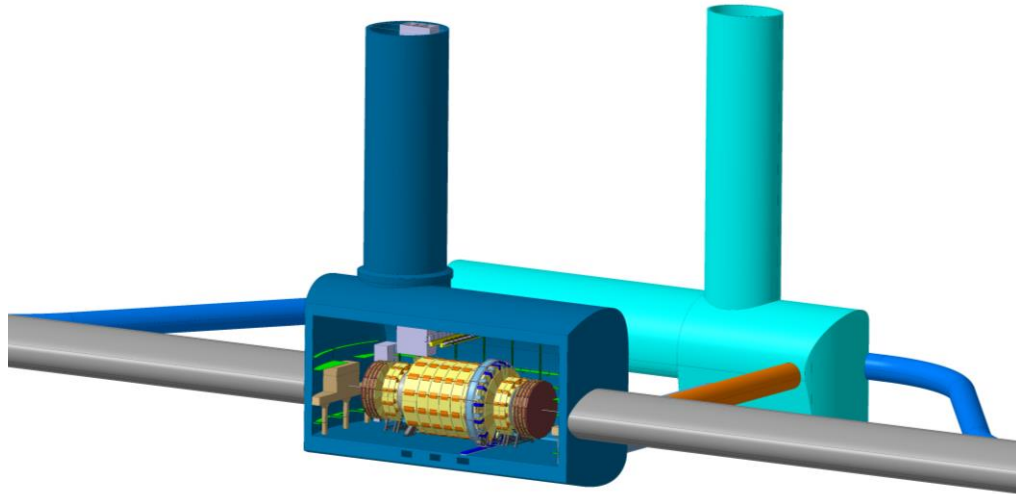
Experimental Shaft $\varnothing 18\text{m}$



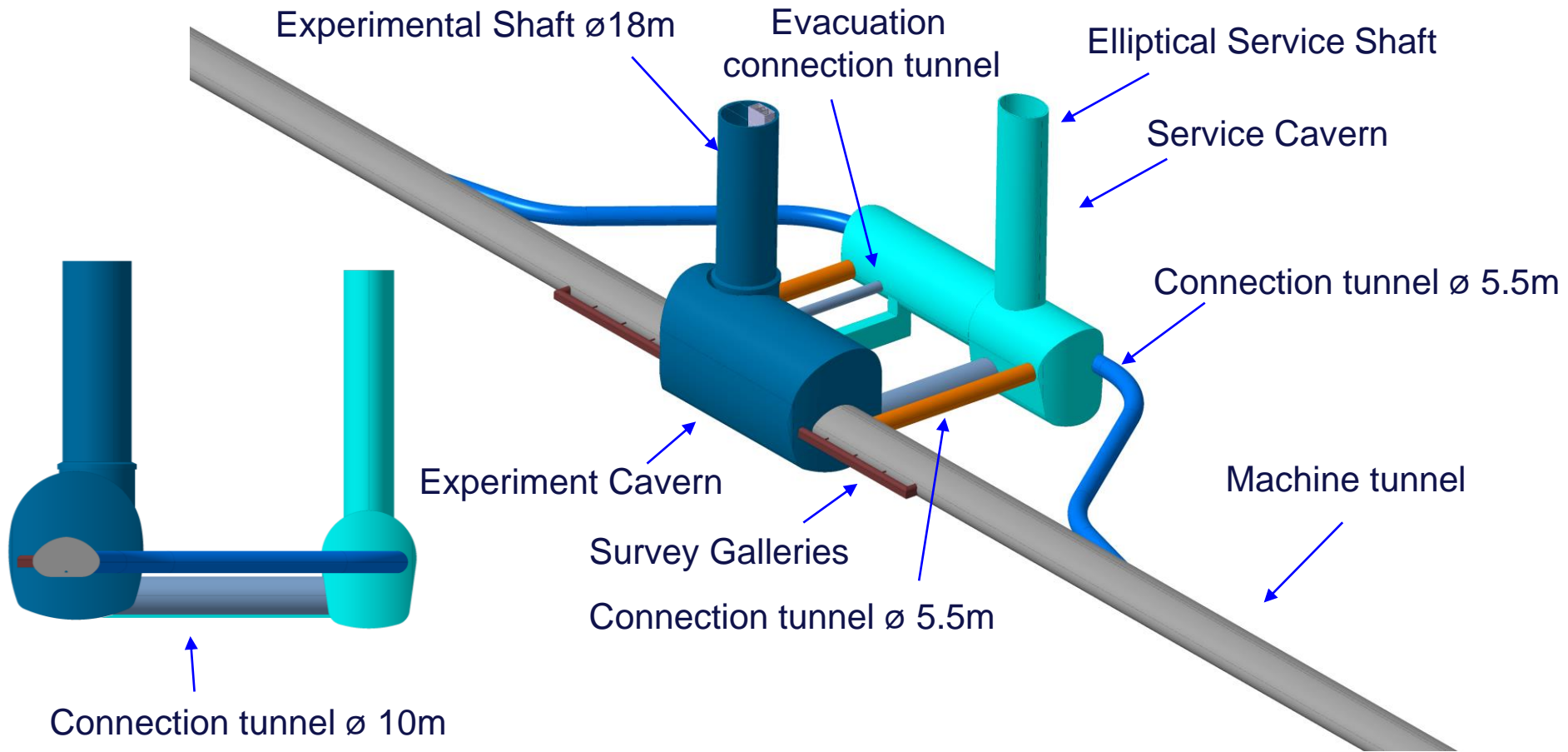
FCC Experiment Underground Structure version 2022



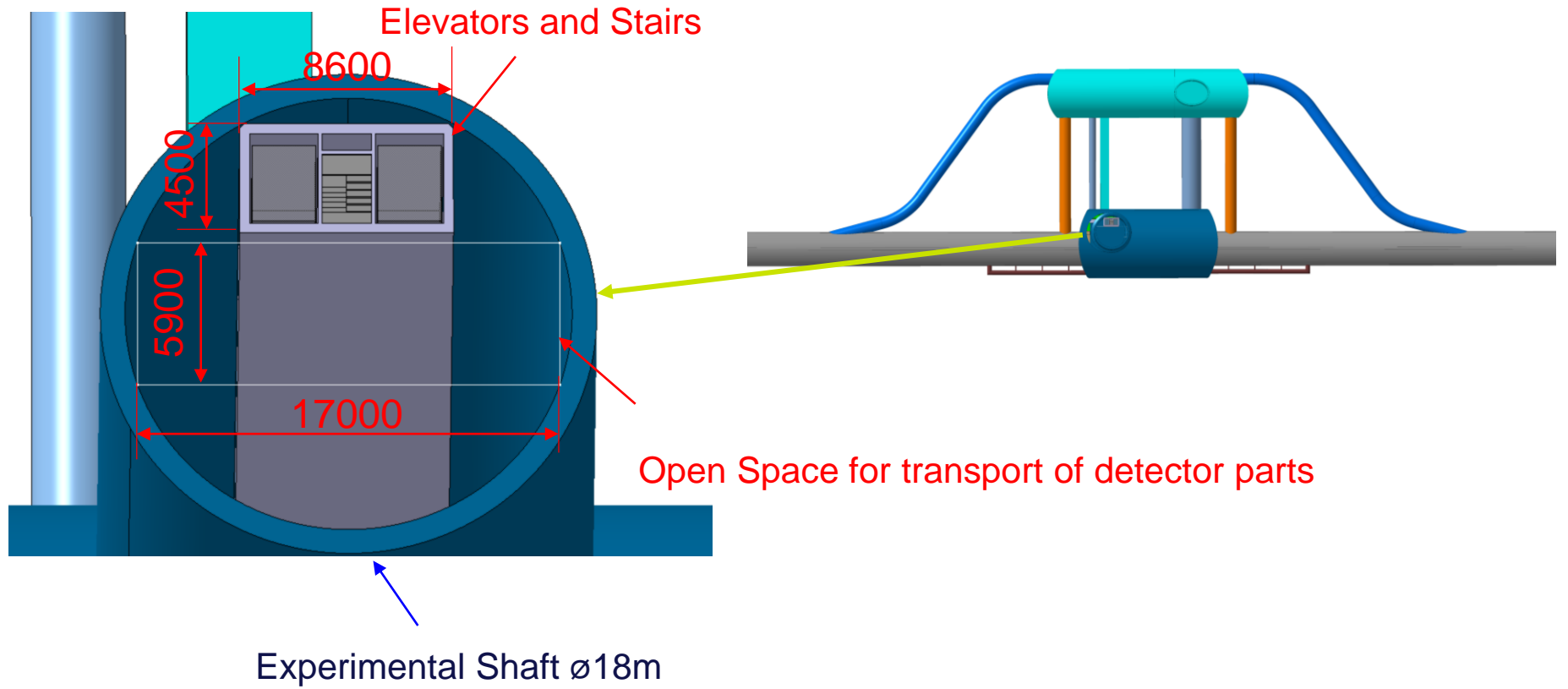
FCC Experiment Underground Structure version 2022



FCC Experiment Underground Structure version 2022



FCC Experiment Underground Structure version 2022





Thank you
for your attention.