

Introduction

Ruth

ELBEX beam optics/beamline design meeting
24.07.25

Overview & Discussion points

- XTD8 opportunity requires redesign of ELBEX extraction beamline
- Current baseline: x-ray photons for fusion and electrons in XTD8 in same beam pipe
- Winni has prepared a double bend extraction beamline concept
- Marin has started beam dynamics calculations in BDsim
- Benno has set up CAD model of XTD3 and surrounding XFEL tunnels in NX

To Discuss:

- How to we proceed towards a beamline design for the ELBEX extraction in XTD3?
- What is our workflow between beam dynamics/optics simulation and integration?
- What are requirements/constraints from tunnel geometry, existing beamlines, transport paths etc? (→ Daniels presentation)
- How do we organize our iterative process to arrive at refined design?

Agenda

10:00 AM	→ 10:10 AM	Intro Speaker: Ruth Magdalena Jacobs (FHR (Bereichsreferent FH))	🕒 10m	📄 ▼
10:10 AM	→ 10:25 AM	Status of ELBEX beam dynamics calculations Speakers: Marin Deniaud, Stewart Boogert (MPY (Beschleunigerphysik))	🕒 15m	📄 ▼
10:25 AM	→ 10:40 AM	ELBEX CAD model status Speaker: Benno List (IPP (Info-management Prozesse u. Projekte))	🕒 15m	📄 ▼
10:40 AM	→ 10:55 AM	T20 Integration model and transfer to XTD8 Speaker: Daniel Thoden (MEA1 (Technische Projektierung)) <div>📄 20250128_ELBEX_k...</div>	🕒 15m	📄 ▼

XTD3 Extraction Beamline Concept

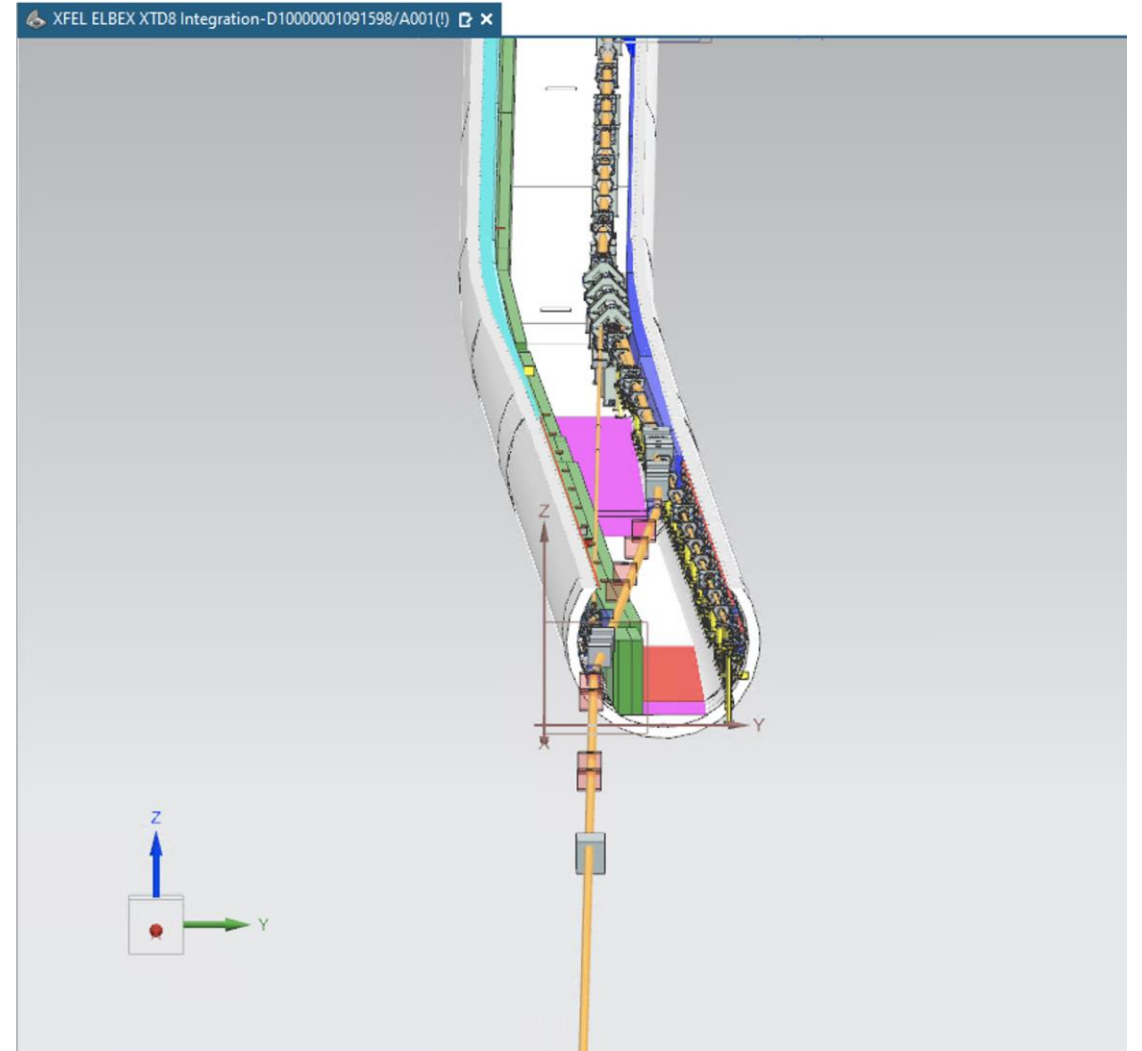
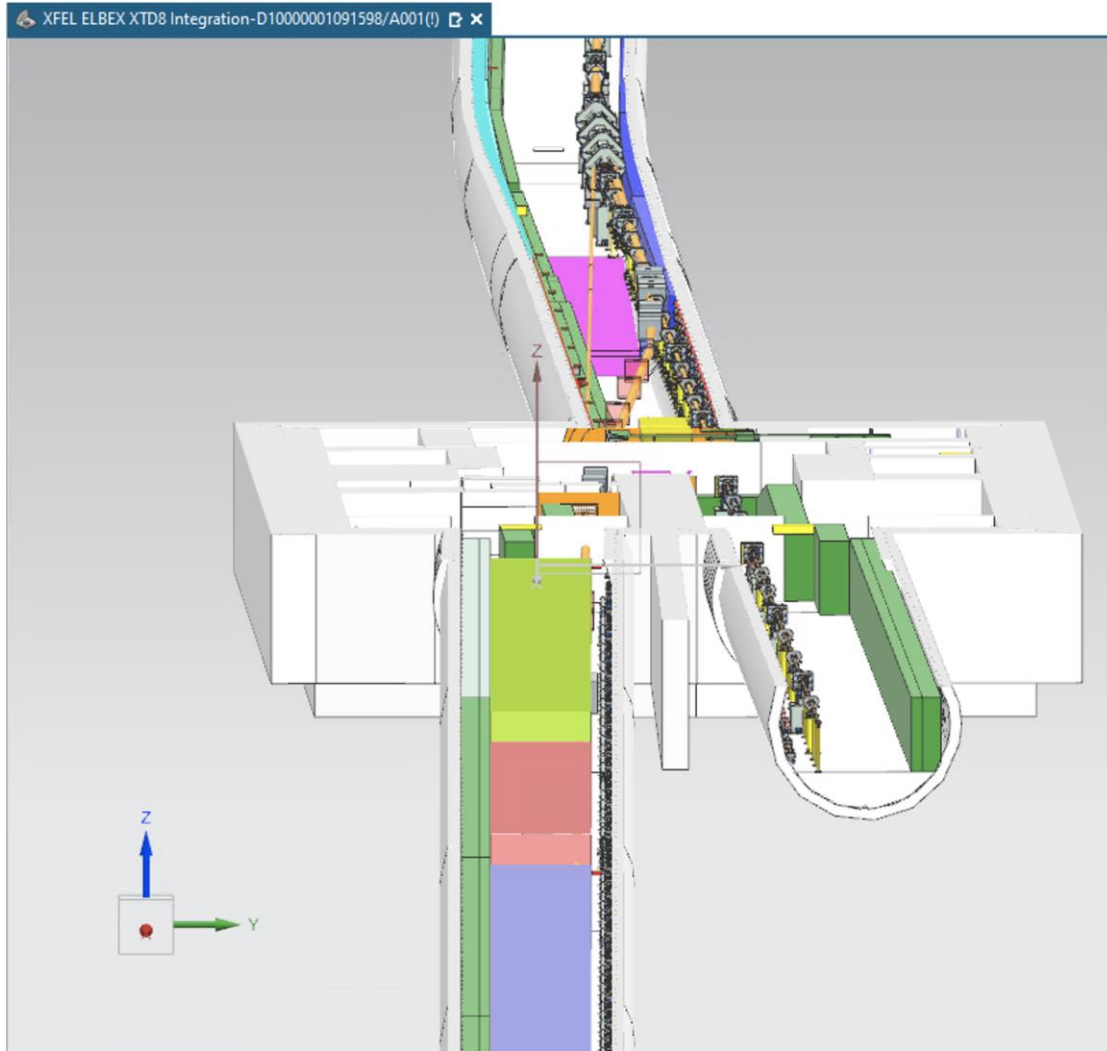
from Winni

- List of Magnets:

SECTION	SUBSECTION	CADRoom	NAME1	NAME2	GROUP	CLASS	TYPE	X	Y	Z
T8	T8	XTD3_005	BSECP.2851.T8	BSECP.T8	PMAGNET	RBEN	BSECP	18.858861	-2.751556	2851.581692
T8	T8	XTD3_005	KP.2861.T8	KP.T8	MAGNET	RBEN	KP	19.831136	-2.755110	2861.316456
T8	T8	XTD3_005	KP.2862.T8	KP.T8	MAGNET	RBEN	KP	19.859064	-2.755449	2862.246037
T8	T8	XTD3_005	KP.2863.T8	KP.T8	MAGNET	RBEN	KP	19.886992	-2.755789	2863.175617
T8	T8	XTD3_005	KP.2864.T8	KP.T8	MAGNET	RBEN	KP	19.914920	-2.756128	2864.105198
T8	T8	XTD3_005	KP.2865.T8	KP.T8	MAGNET	RBEN	KP	19.942848	-2.756468	2865.034778
T8	T1M	XTD3_006	BZ.2876.T8	BZ.1.T8	MAGNET	SBEN	BZ	20.277086	-2.760557	2876.234786
T8	T1M	XTD3_006	BZ.2878.T8	BZ.2.T8	MAGNET	SBEN	BZ	20.330906	-2.761481	2878.766306
T8	T1M	XTD3_007	BZ.2880.T8	BZ.2.T8	MAGNET	SBEN	BZ	20.348957	-2.762029	2880.266192
T8	T1M	XTD3_007	BZ.2881.T8	BZ.2.T8	MAGNET	SBEN	BZ	20.353509	-2.762577	2881.766180
T8	T1M	XTD3_007	QH.2887.T8	QH.1.T8	MAGNET	QUAD	QH	20.320800	-2.764682	2887.532135
T8	T1M	XTD3_007	QH.2890.T8	QH.2.T8	MAGNET	QUAD	QH	20.305695	-2.765607	2890.064190
T8	T1M	XTD3_007	QH.2892.T8	QH.1.T8	MAGNET	QUAD	QH	20.290590	-2.766531	2892.596245
T8	T1M	XTD3_007	BE.2899.T8	BE.1.T8	MAGNET	SBEN	BE	20.236720	-2.768910	2899.112009
T8	T1M	XTD3_007	QF.2906.T8	QF.1.T8	MAGNET	QUAD	QF	19.985409	-2.771470	2906.123492
T8	T1M	XTD3_007	QF.2911.T8	QF.2.T8	MAGNET	QUAD	QF	19.775431	-2.773489	2911.651605
T8	T1M	XTD3_007	QF.2920.T8	QF.3.T8	MAGNET	QUAD	QF	19.451584	-2.776602	2920.177557
T8	T1M	XTD3_007	QF.2925.T8	QF.4.T8	MAGNET	QUAD	QF	19.241606	-2.778620	2925.705670
T8	T1M	XTD3_008	BE.2935.T8	BE.2.T8	MAGNET	SBEN	BE	18.888399	-2.782092	2935.215142
T8	T1M	XS4_000	QH.2941.T8	QH.1.T8	MAGNET	QUAD	QH	18.744135	-2.784471	2941.729577
T8	T1M	XS4_000	QH.2944.T8	QH.2.T8	MAGNET	QUAD	QH	18.691180	-2.785395	2944.261123
T8	T1M	XS4_000	QH.2946.T8	QH.1.T8	MAGNET	QUAD	QH	18.638224	-2.786319	2946.792669
T8	T1M	XS4_000	BE.2953.T8	BE.2.T8	MAGNET	SBEN	BE	18.509941	-2.788698	2953.307438
T8	T1D	XS4_000	QF.2955.T8	QF.5.T8	MAGNET	QUAD	QF	18.492225	-2.789617	2955.823415
T8	T1D	XS4_000	QF.2961.T8	QF.6.T8	MAGNET	QUAD	QF	18.470845	-2.791637	2961.355473
T8	T1D	XTD8_001	QF.2981.T8	QF.5.T8	MAGNET	QUAD	QF	18.391492	-2.799133	2981.887419
T8	T1D	XTD8_001	QF.2987.T8	QF.6.T8	MAGNET	QUAD	QF	18.370112	-2.801153	2987.419477Here
T8D	T1D	XTD5_001	BV.3008.T8D	BV.1.T8D	MAGNET	SBEN	BV	18.286957	-2.829461	3008.935208

XTD3 beamline concept

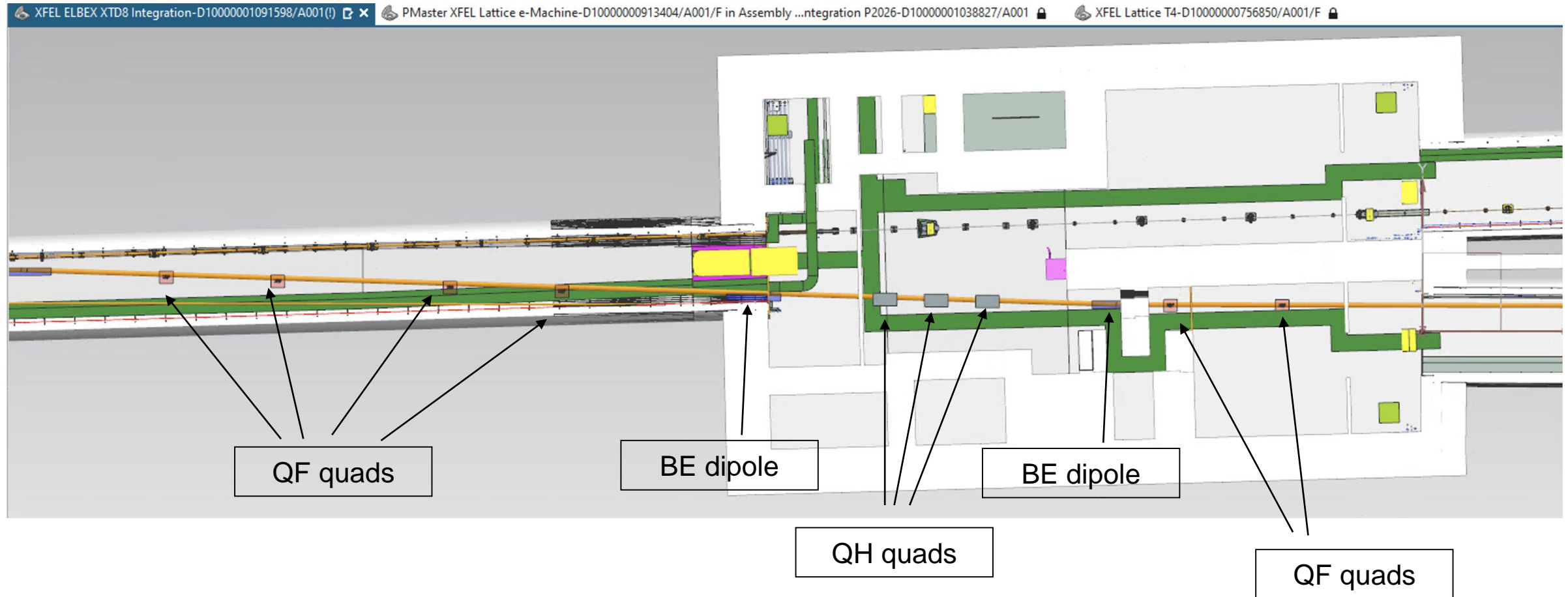
„Double bend“



XTD3 beamline concept



XTD3 beamline concept

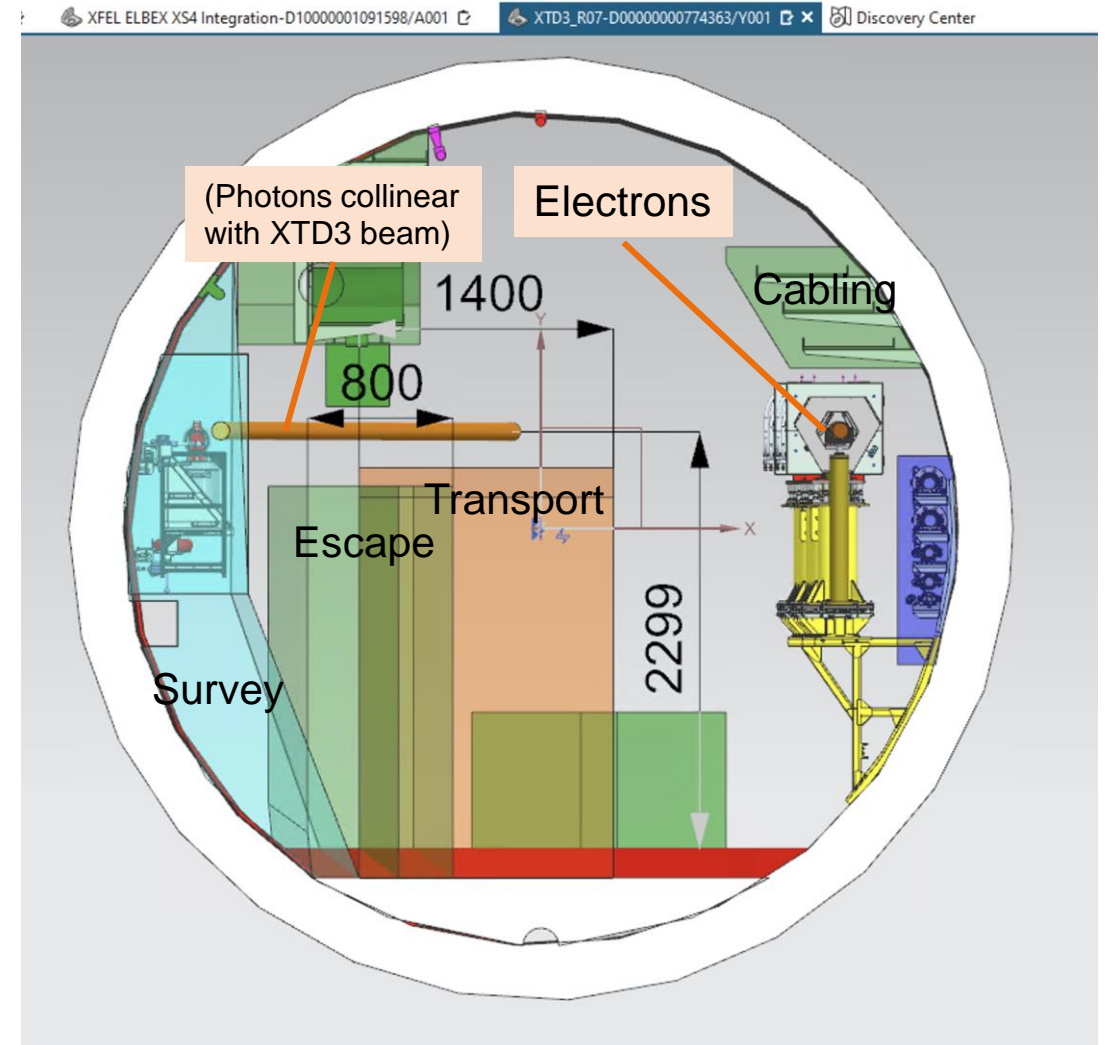
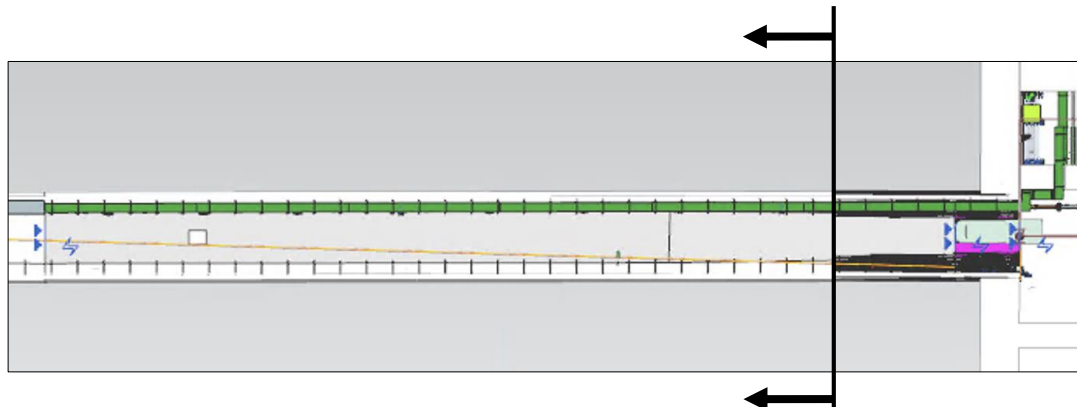


Backup

XTD3 Tunnel Cross Section

Installation space for new electron extraction line

- Shown: Tunnel cross section at end of XTD3 tunnel
- Electron beam line in 2.3m height
- crosses the tunnel overhead
- Need to respect escape routes and transport paths
- Alignment and survey systems need to remain free
- No metal welding plates in tunnel ceiling like in XTL, weight limit on ceiling mount elements



Tunnel pictures



Tunnel pictures

