

SURVEY & ALIGNMENT STATUS

ALBA

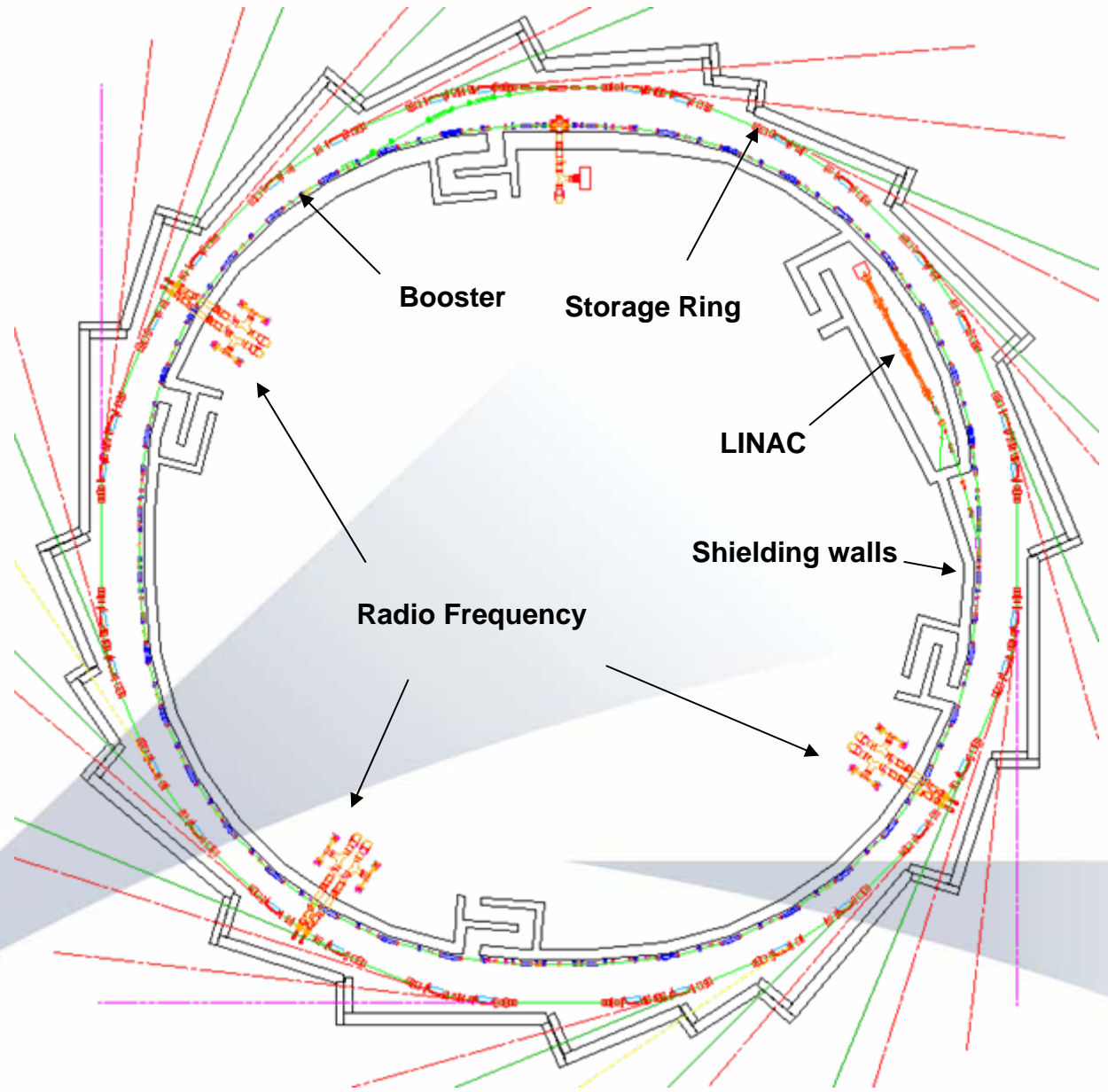
Synchrotron Light Facility



Fabien Rey

CELLS – S&A Group

Layout:



Outline:

- **Survey & Alignment Group : *Instrumentation and Resources***
- **Building: *Critical Slab and Tunnel Construction***
- **Network : *Installation, Measurements, Results***
- **Dimensional Crosschecks:
*Girders, Vacuum Chambers, Fiducialization.***
- **Next Steps**

➤ Survey & Alignment Group :

Instrumentation

- Call for tender
- Contract
- Reception

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➤ Survey & Alignment Group :

Instrumentation

- 1 Laser Tracker Faro XI V2
- 1 Total Station Leica TDA 5005
- 1 Theodolite Leica TM 5100 A
- 1 Digital Level TRIMBLE DINI 12
- 1 Optical level WILD N3
- 1 3D FARO Measuring Arm (2.4 m)
- 3D METROLOGY SOFTWARE: Spatial Analyser from NRK



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➤ Survey & Alignment Group :

Resources

- 2 new recruitments:

Esther Pulido



Albert Villalobos



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➤ **Building**

Initial Status



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➤ **Building**

Start excavation



Vegetal layer removal



Soil movements



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➤ Building



Piles execution



Surface foundation



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➤ Building



Piles

Technical building excavation



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➤ Building



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➤ Building



Technical building basement



Critical floor area

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➤ Building

Critical slab execution



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➤ Building

Shielding Wall



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➤ Building



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➤ Building

Metallic structure



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➤ Building



Experimental Hall

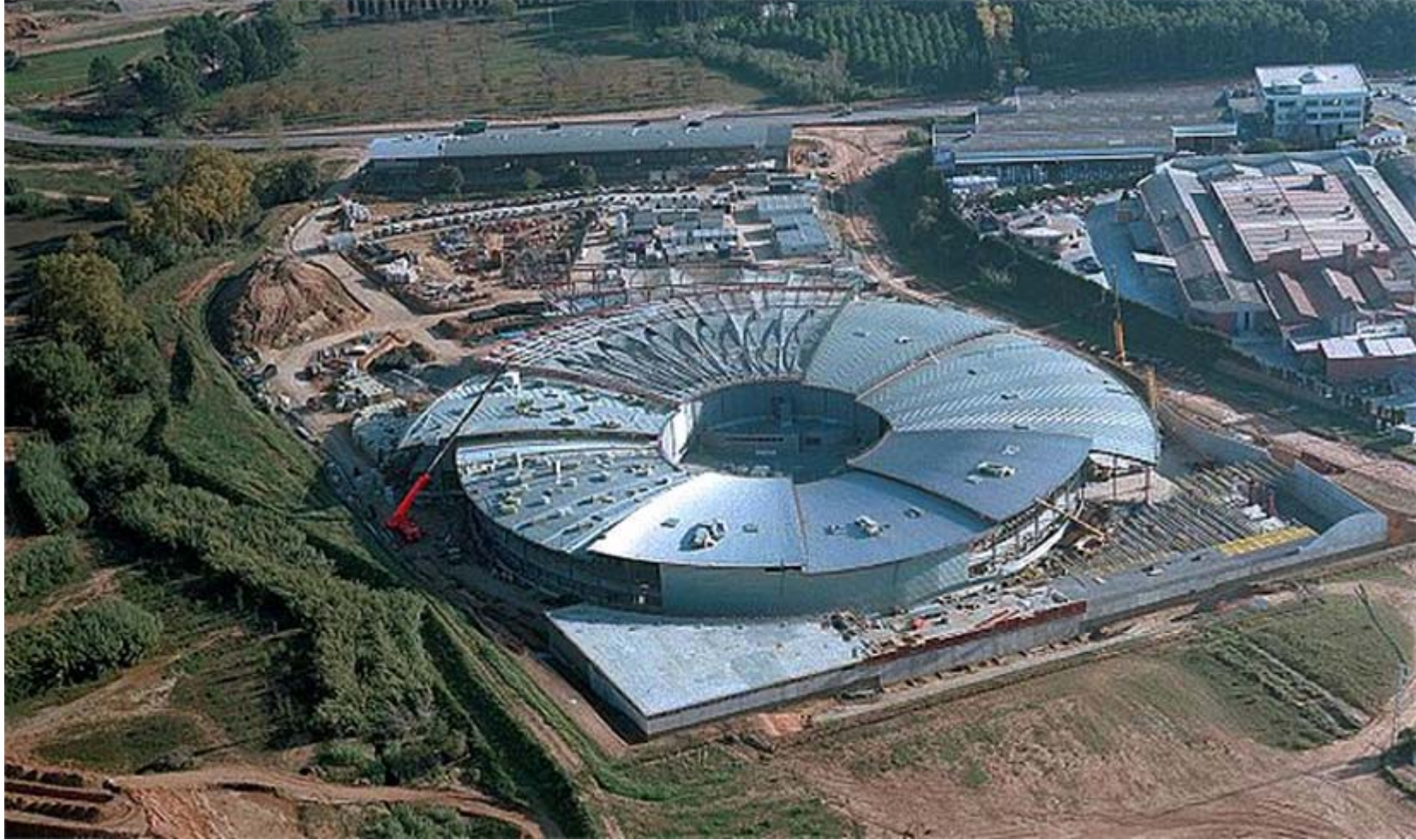


Tunnel



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 **Building**



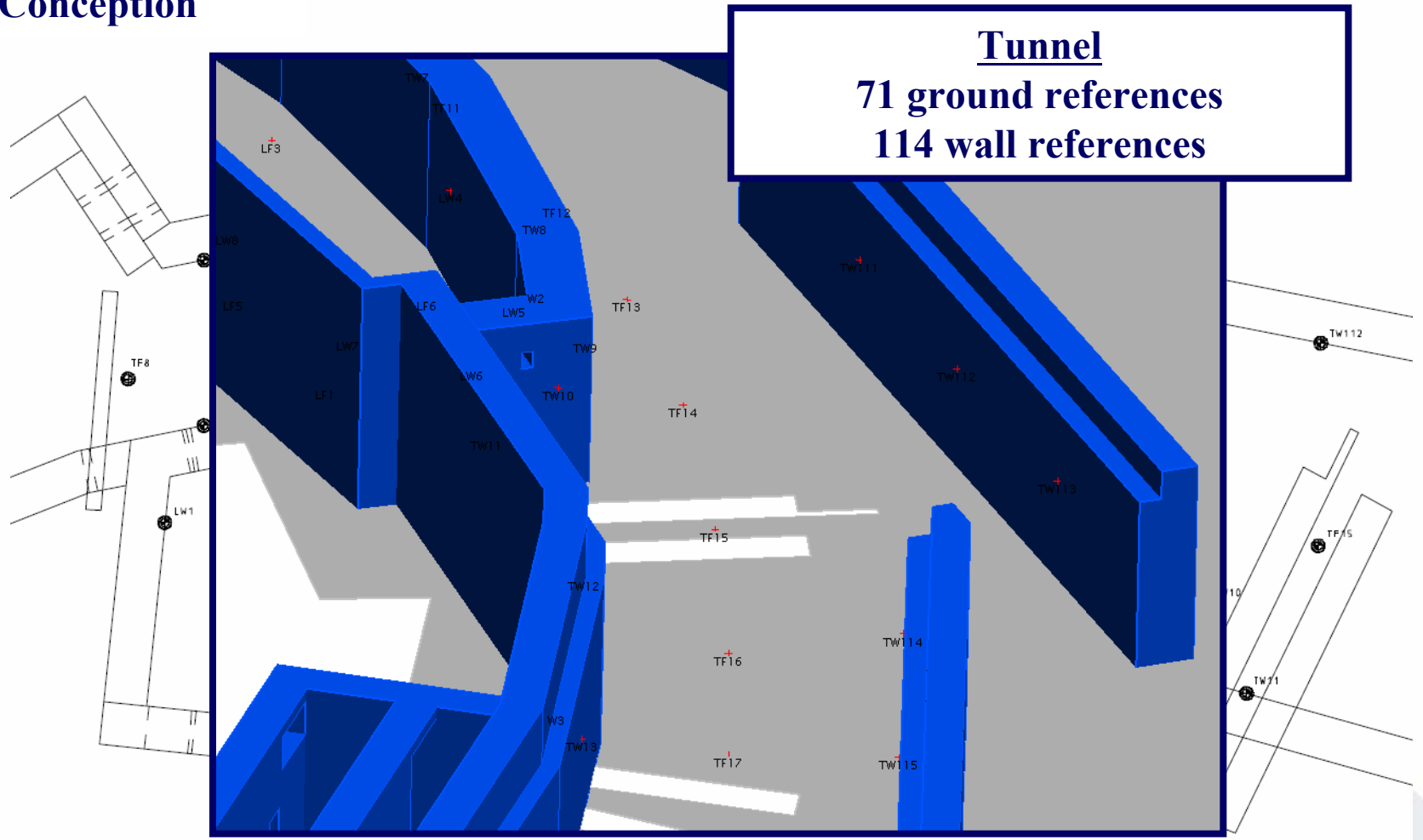
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➤ Network

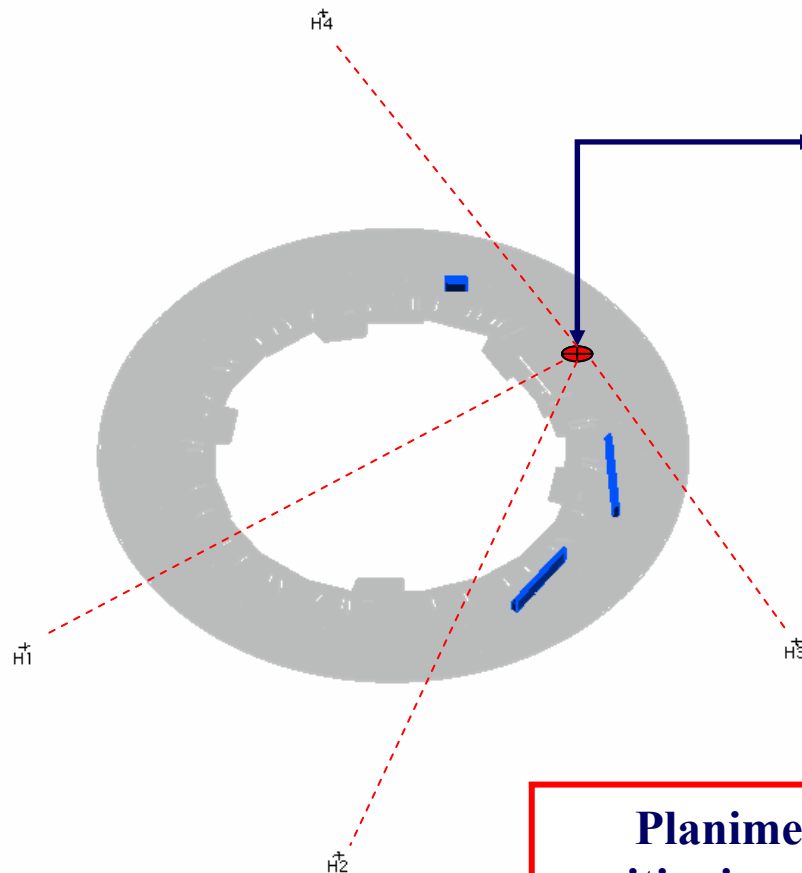
▪ Conception



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➤ Network

▪ Installation



**Planimetric error in
 positioning the instrument :
 $1 \sigma = \pm 1.8 \text{ mm}$**



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➤ Network

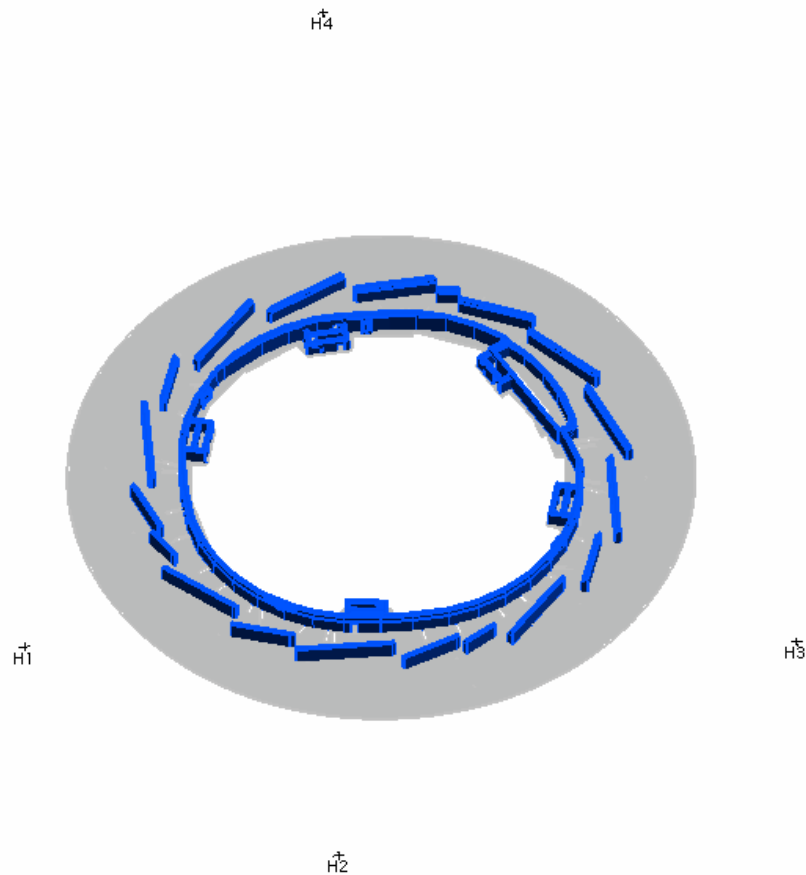
▪ Installation



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➤ Network

▪ Installation



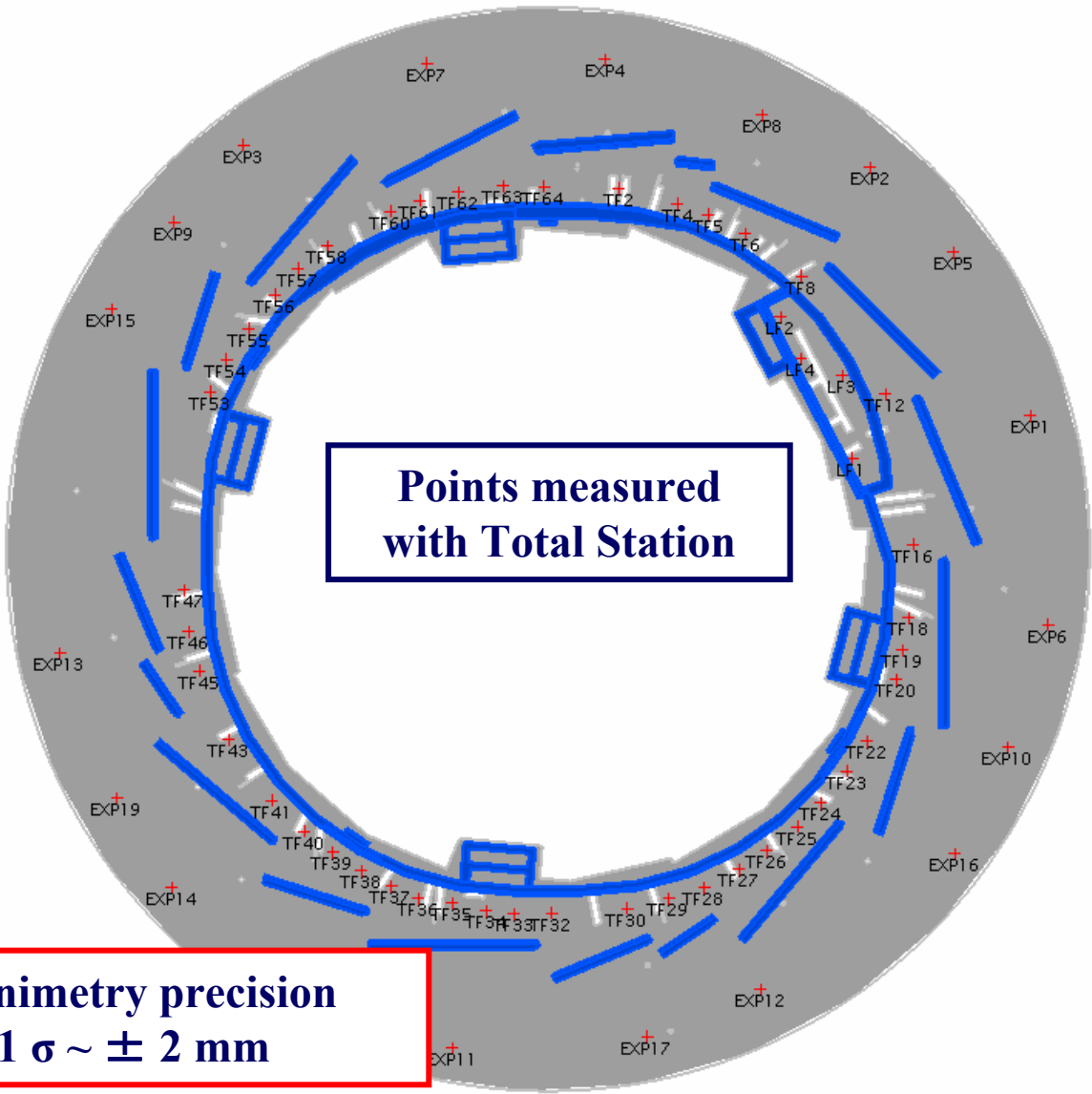
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Network

Point Name	X	Y
TF2	7832.1981	39978.2513
TF4	14337.1196	38288.4474
TF5	17694.1429	37092.1579
TF6	21918.7696	34999.2808
TF8	28089.7174	30216.0284
TF12	37391.5850	17130.4842
TF16	40431.9786	506.9583
TF18	39951.2775	-7530.9180
TF19	39366.2301	-11155.1961
TF20	38583.9290	-14358.2237
TF22	35370.4587	-21251.8569
TF23	33069.5317	-24567.6386
TF24	30214.7306	-28123.2295
TF25	27665.8927	-30699.5801
TF26	24301.0211	-33334.5983
TF27	21141.4838	-35418.7637
TF28	17336.0167	-37486.9128
TF29	13349.0356	-38722.2422
TF30	8752.3800	-39772.1370
TF32	398.8269	-40275.9344
TF33	-3763.7311	-40347.8495
TF34	-6828.6397	-40036.9295
TF35	-10650.9423	-39213.6819
TF36	-14279.3966	-38642.2198
TF37	-17346.6942	-37300.1085
TF38	-20663.7952	-35647.3476
TF39	-23817.8529	-33557.1202
TF40	-27058.1672	-31232.4301
TF41	-30608.9225	-27805.1837
TF43	-35375.2257	-21020.2874
TF45	-38625.1849	-13470.8611
TF46	-39839.8463	-9126.6772
TF47	-40346.3596	-4485.7319
TF53	-37437.4527	17425.6895
TF54	-35609.9455	20991.0702
TF55	-33205.3948	24452.6158
TF56	-30243.5670	28217.4799
TF57	-27724.9156	31066.7789
TF58	-24469.2133	33557.1490
TF60	-17472.6488	37425.4196
TF61	-14211.8034	38633.0386
TF62	-9896.5677	39524.6211
TF63	-4	-
TF64	-	-

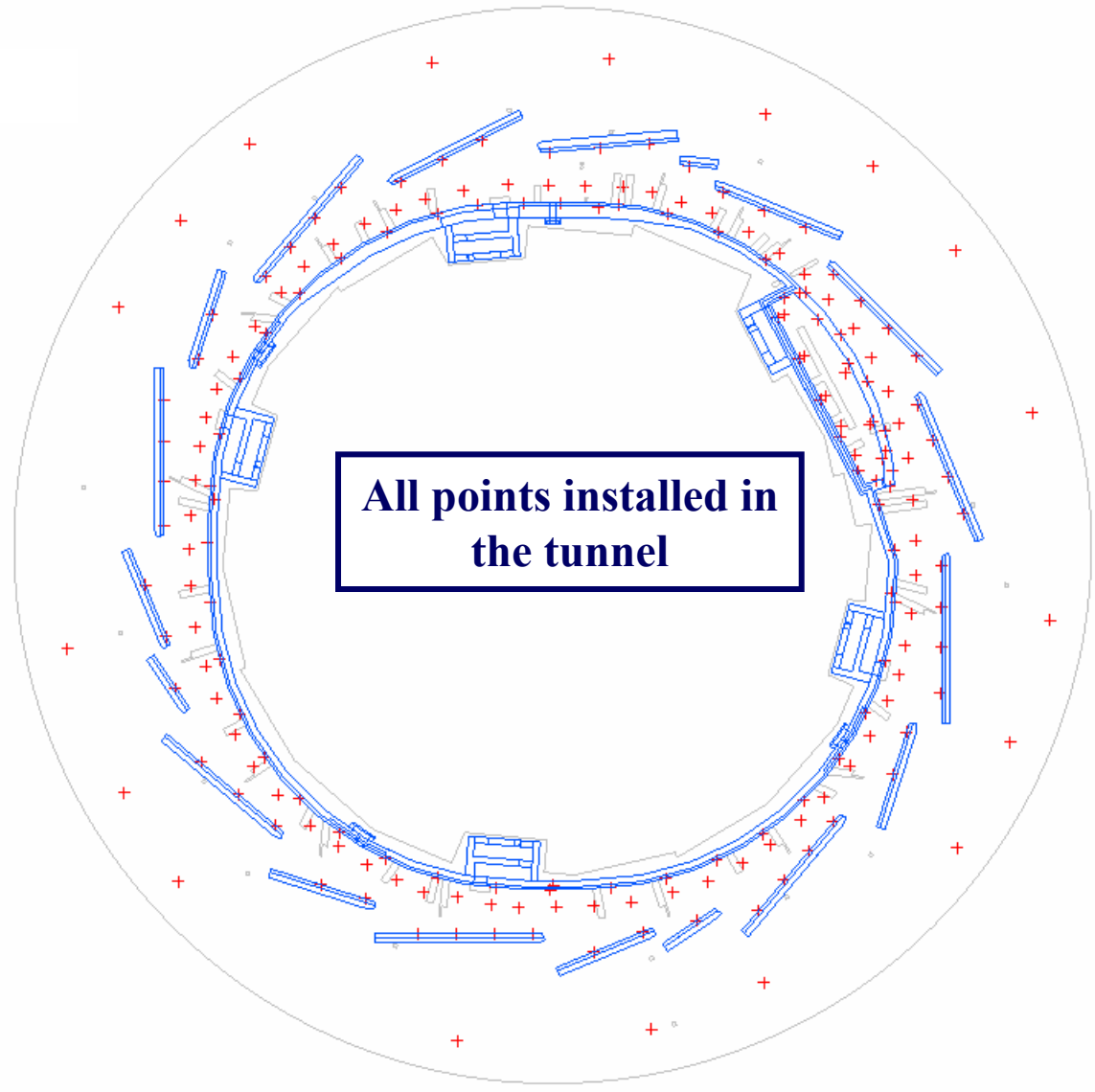


Planimetry precision
 $1 \sigma \sim \pm 2 \text{ mm}$

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➤ Network

▪ Installation



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Network

Altimetry

Point Name	Z
TF1	0.0153
TF2	-1.0761
TF3	10.4227
TF4	9.3715
TF5	11.9601
TF6	3.1984
TF7	11.6669
TF8	14.0155
TF9	11.1042
TF10	7.3827
TF11	14.1515
TF12	1.9803
TF13	13.6994
TF14	9.1984
TF15	10.8075
TF16	9.3367
TF17	2.0461
TF18	6.9956
TF19	3.0152
TF20	8.1850
TF21	7.9250
TF22	7.2850
TF23	16.7953
TF24	10.1957
TF25	5.9962
TF26	4.2169
TF27	8.9976
TF28	11.8886
TF29	
TF30	
TF31	
TF32	
TF33	
TF34	
TF35	
TF36	10.4092
TF37	16.8004
TF38	16.7618
TF39	13.6432
TF40	5.9646
TF41	17.8064
TF42	12.0378
TF43	9.2591
TF44	12.7704
TF45	7.4213
TF46	13.1624
TF47	9.3233
TF48	13.3940
TF49	15.4946



**Altimetry precision:
 $1 \sigma = \pm 0.08 \text{ mm}$**

**Double run leveling.
 30 stations
 380 observations**

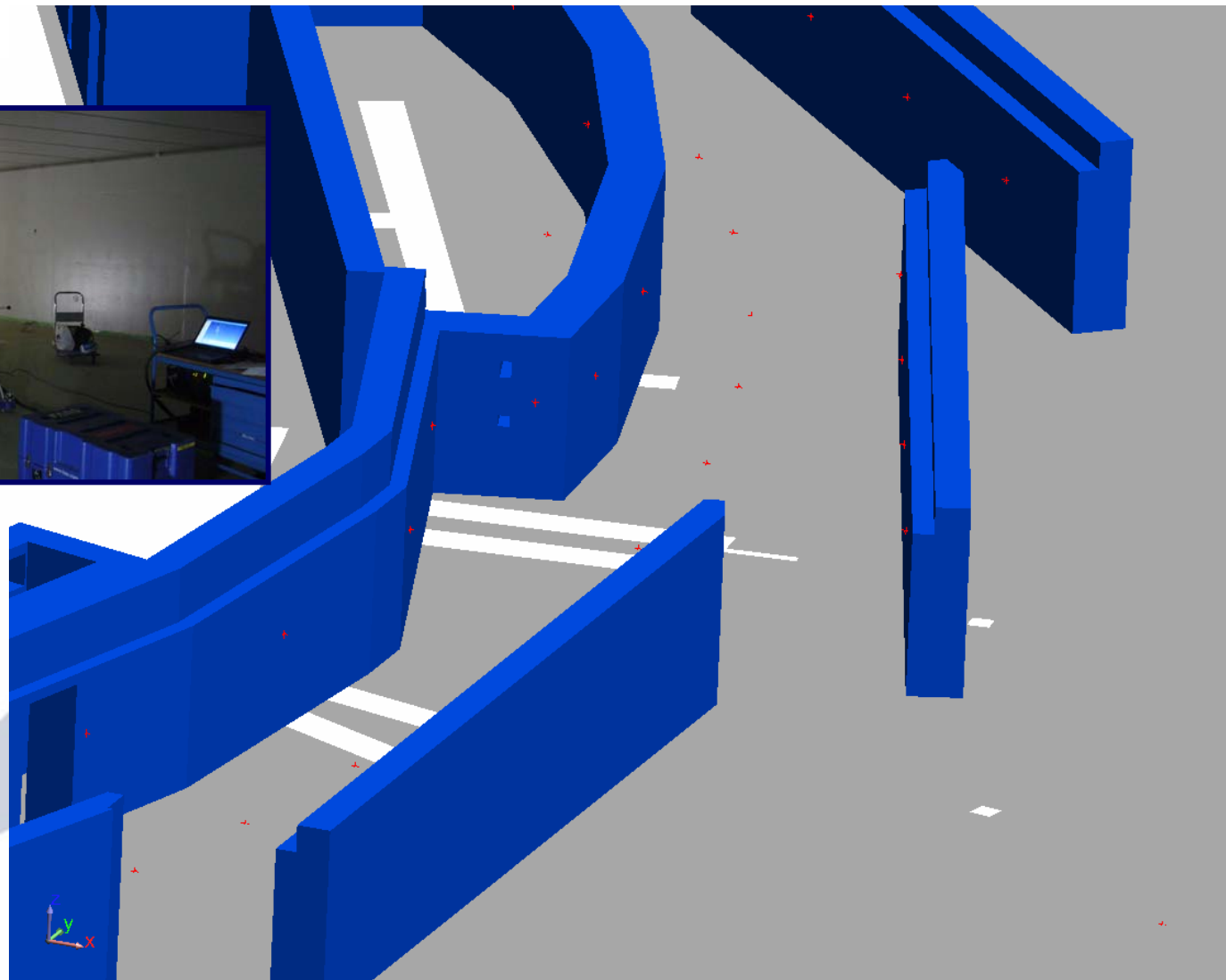
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➤ Network

▪ Planimetry



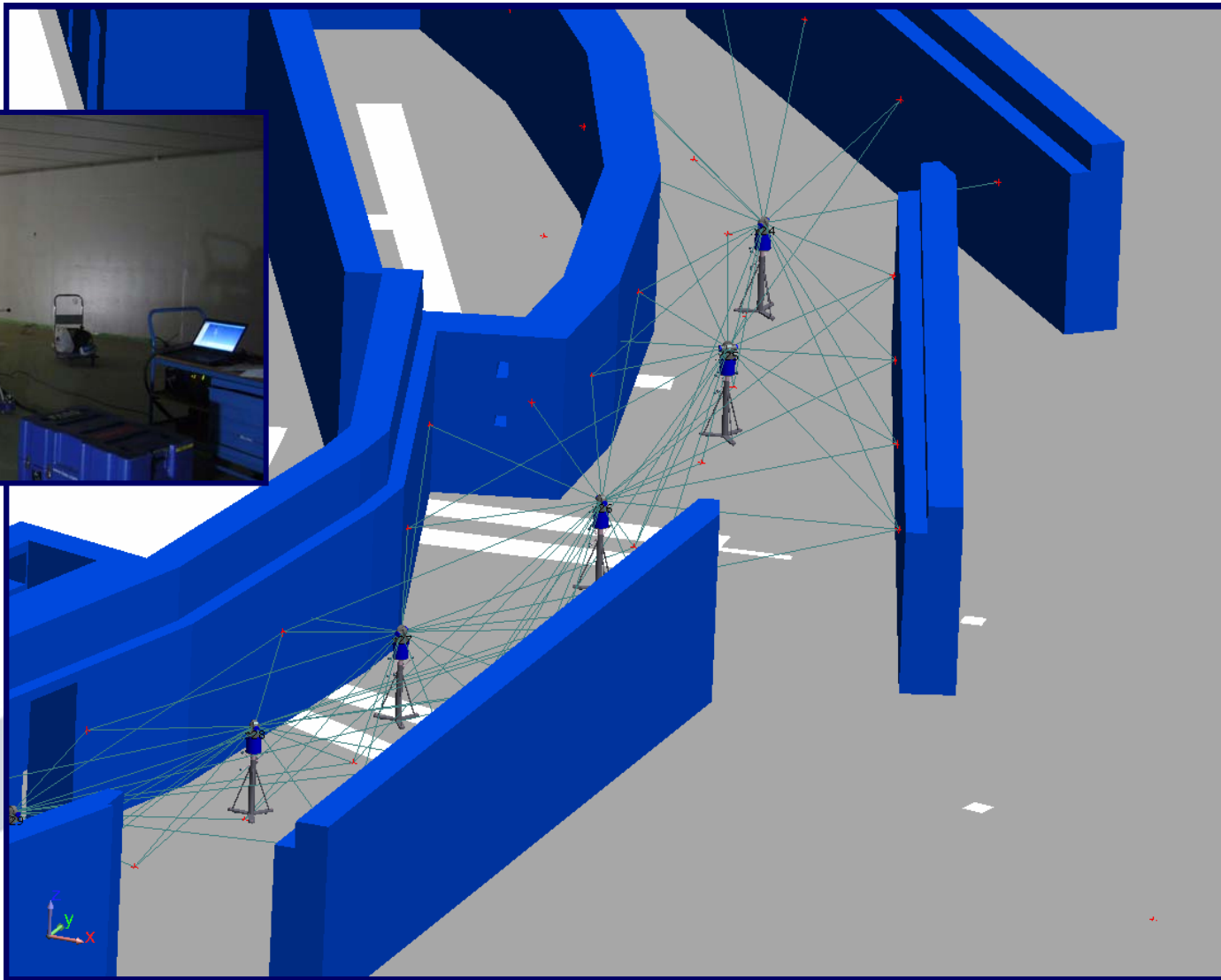
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➤ Network

▪ Planimetry

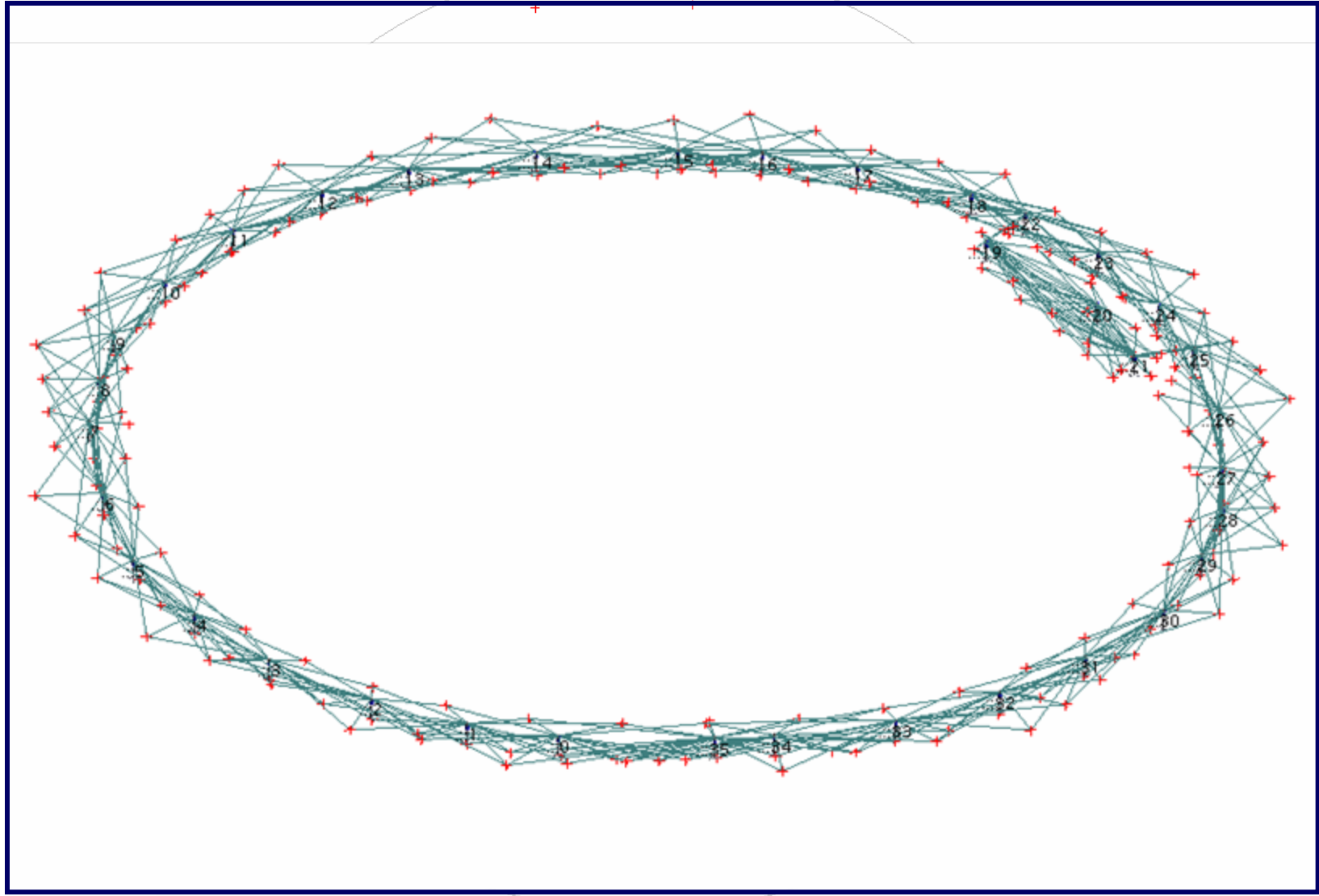


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➤ Network



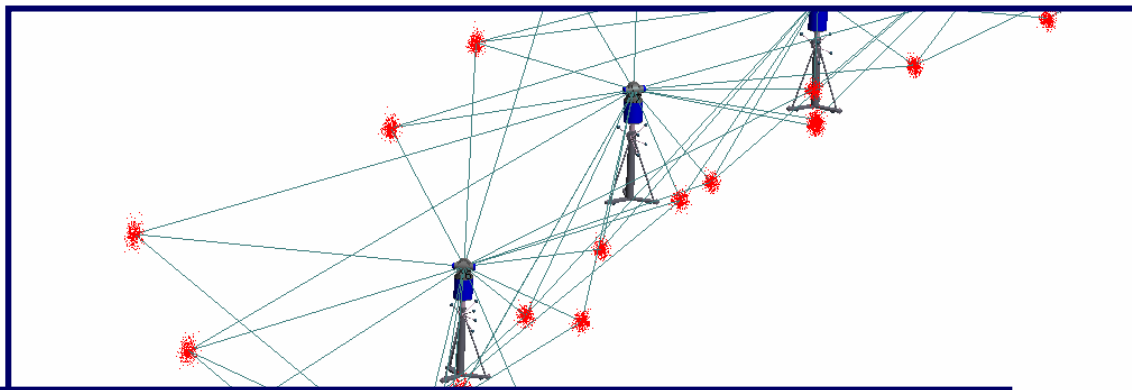
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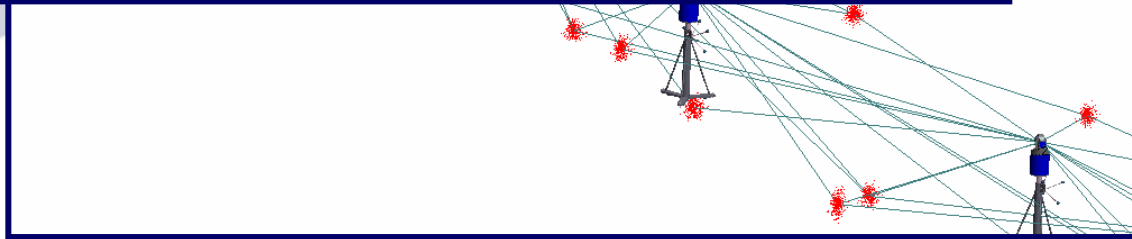
- 2008
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➤ Network

▪ Planimetry



USMN: Unified Spatial Metrology Network
Point Error: Overall RMS = 0.01787, Average = 0.01191, Max = 0.11969 'TF22'
System Solution Time: 4.8 sec
Uncertainty Magnitude: Average = 0.09475, Max = 0.12191 'TW123'
68.26% Confidence Interval (1.0 sigma), Samples: 300, WCF: FRAMES::LOCAL
Uncertainty Analysis Time: 24 min, 10 sec
No scale bars defined.
Unit: mm.

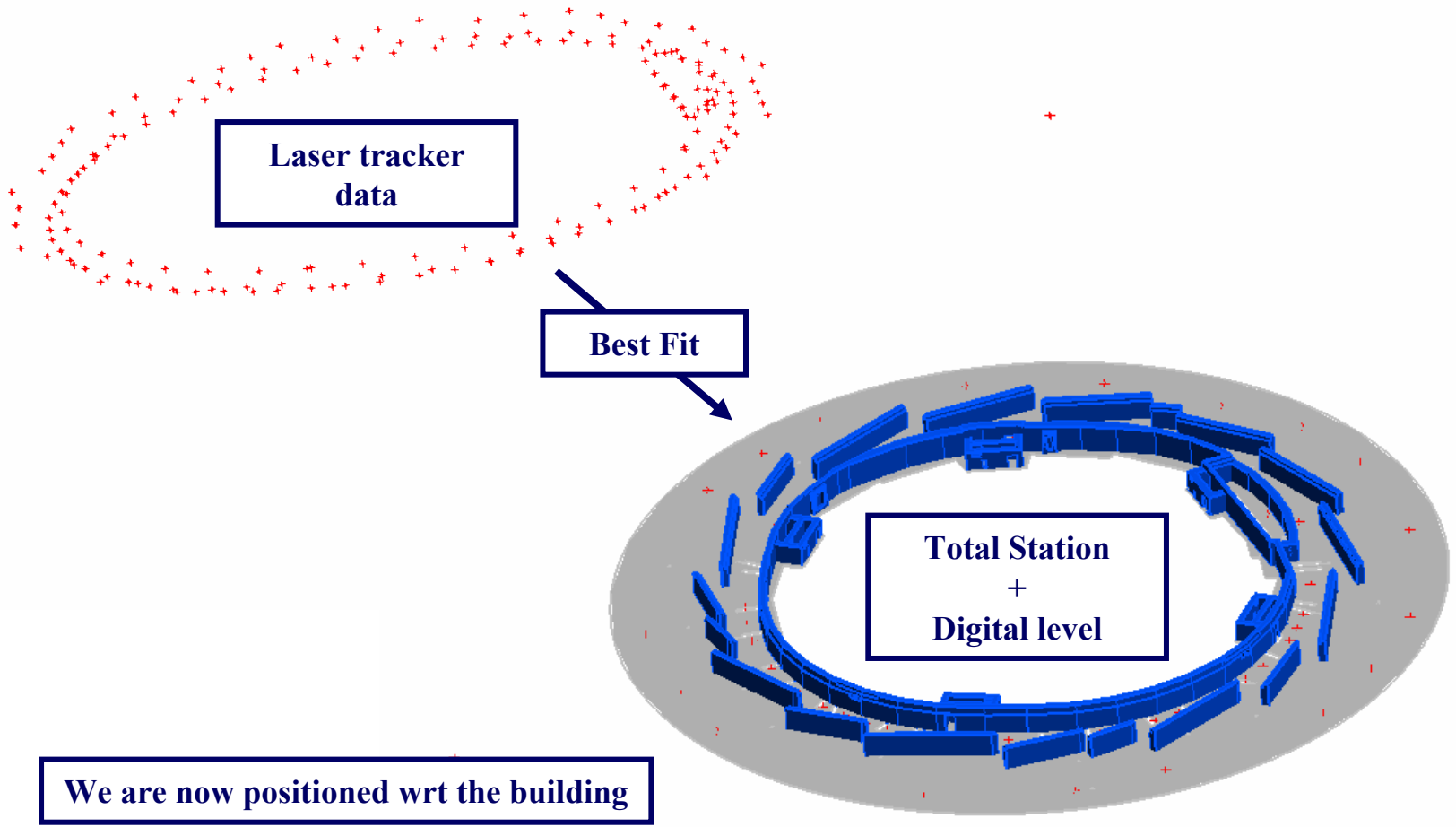


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➤ Network



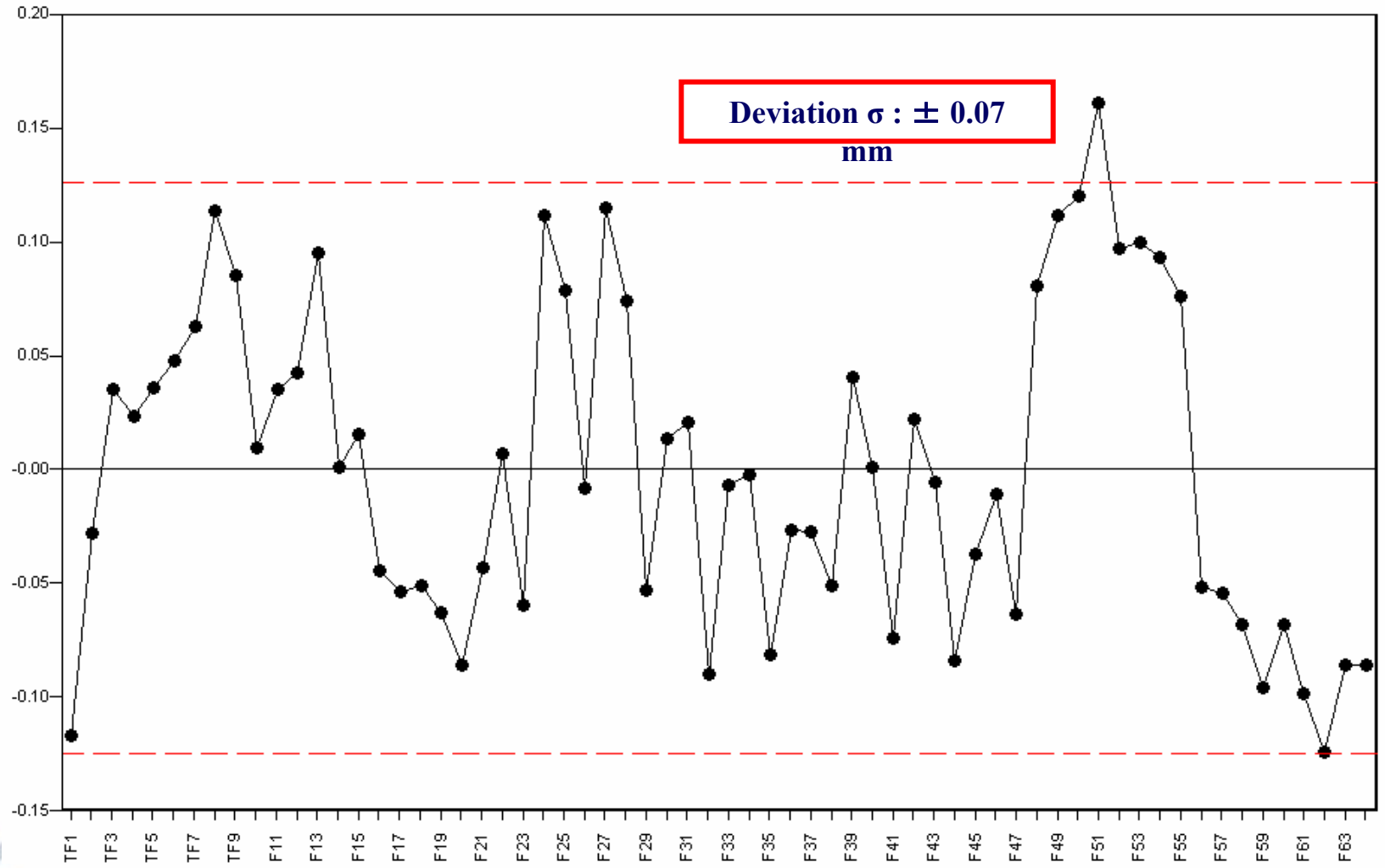
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Network

**Elevation of the tunnel ground marks
 Comparison Tracker/Digital Level (mm)**



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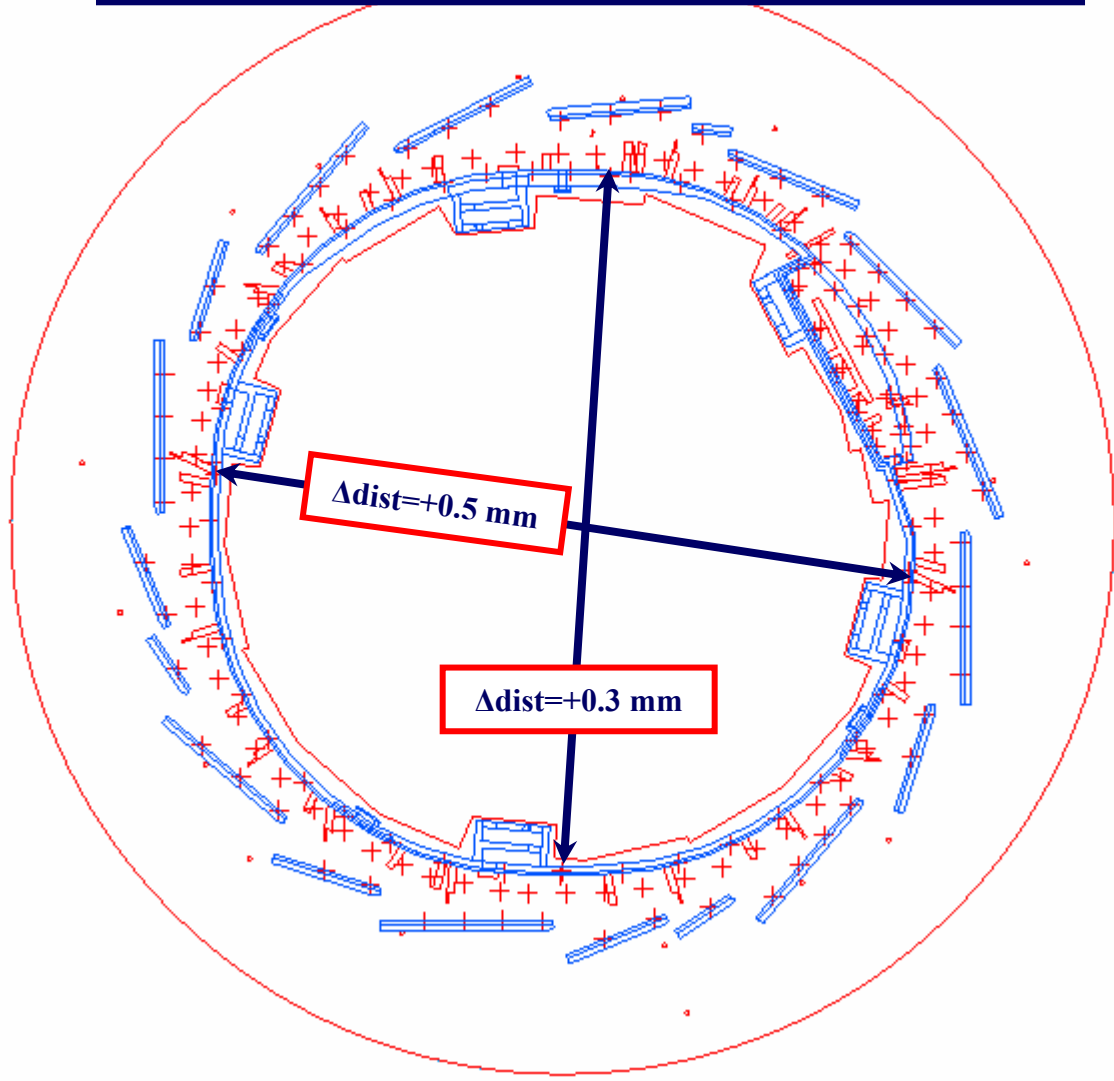
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➤ Network



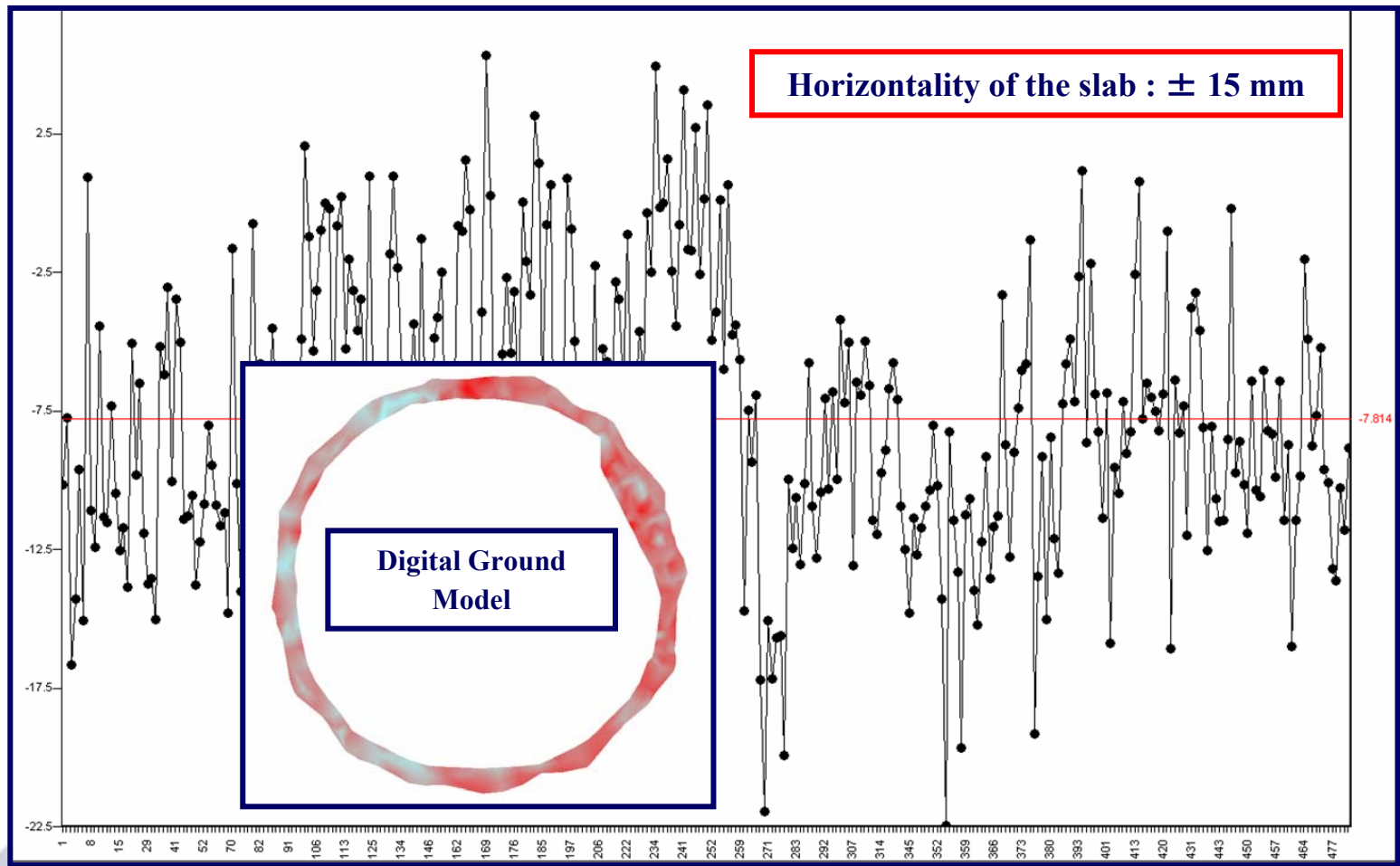
Diameter Crosschecks
Comparison Total Station/Tracker (mm)



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Network

As built
Ground elevation along the tunnel (mm)



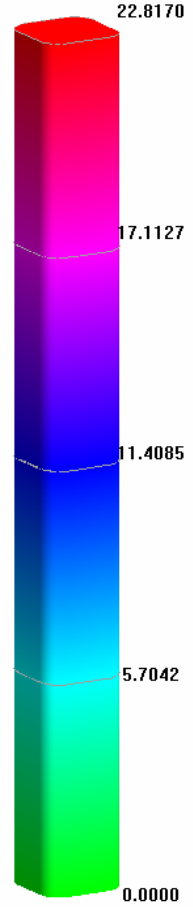
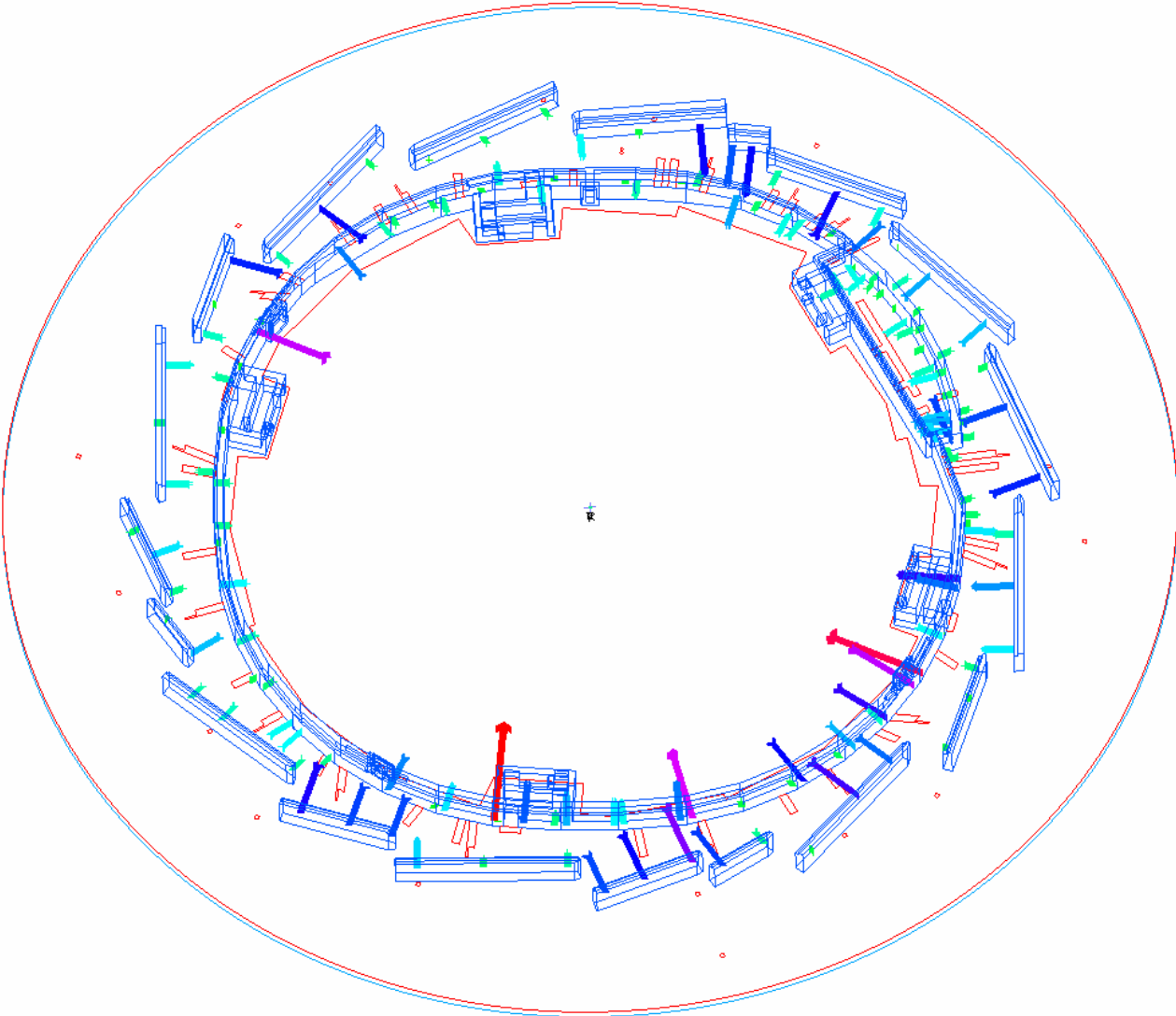
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Network

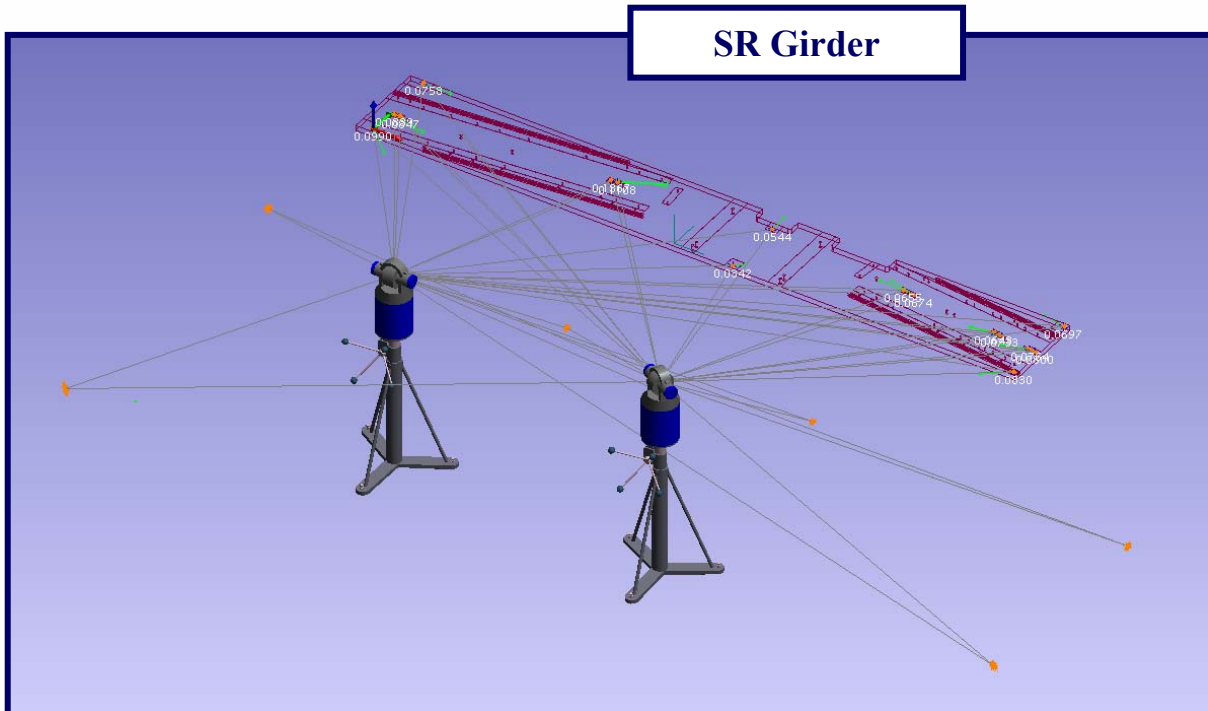
As built
Wall deviation along the tunnel (mm)



asbuilt wall projected2-ASBUILTwall.txt

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➤ Dimensional Crosschecks

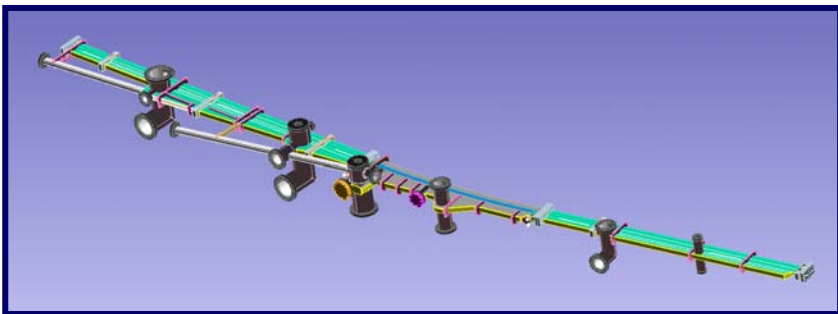


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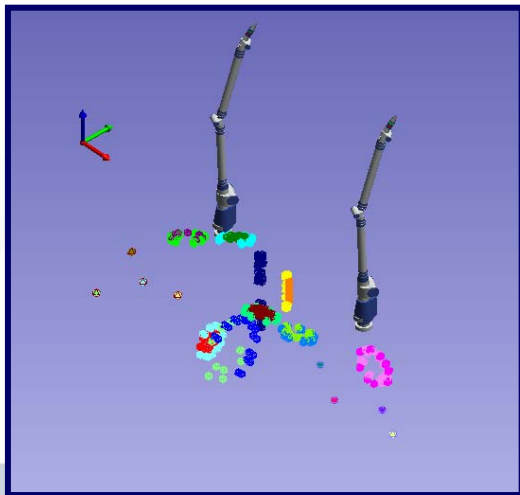
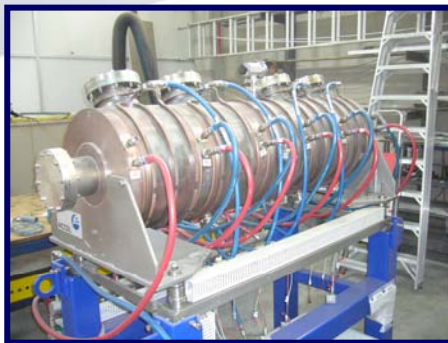
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➤ Dimensional Crosschecks



Vacuum Chambers



RF Cavity

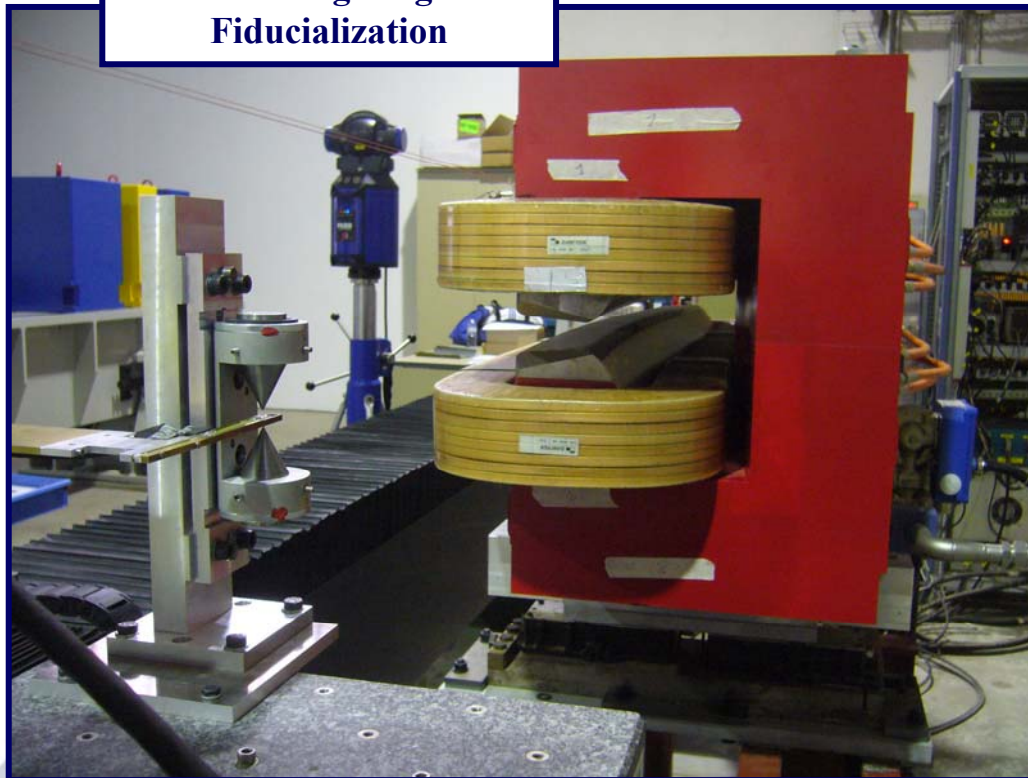
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➤ Dimensional Crosschecks

SR Bending Magnets
 Fiducialization



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➤ Next Steps

- **Machine and Beamlines installation**
- **Monitor the evolution of the network**
- **Improve the uncertainty**

**Thank you for your
attention**