

Alignment for the ALBA Project



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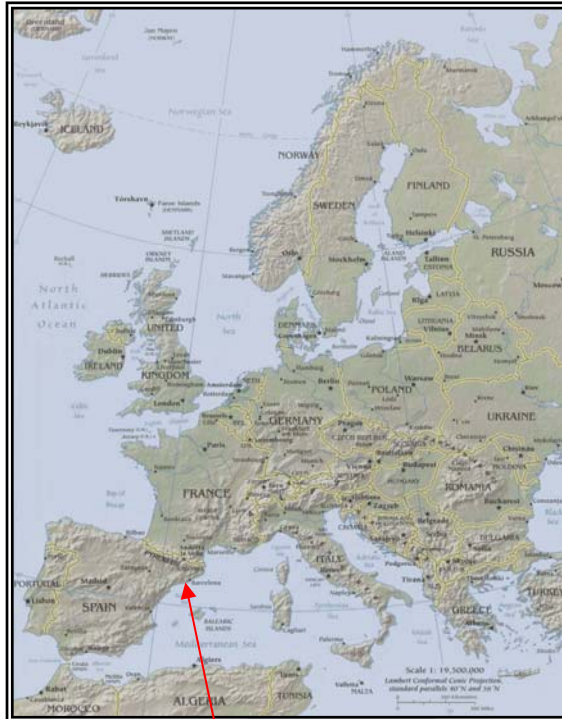
08193 Bellaterra,

BARCELONA - SPAIN

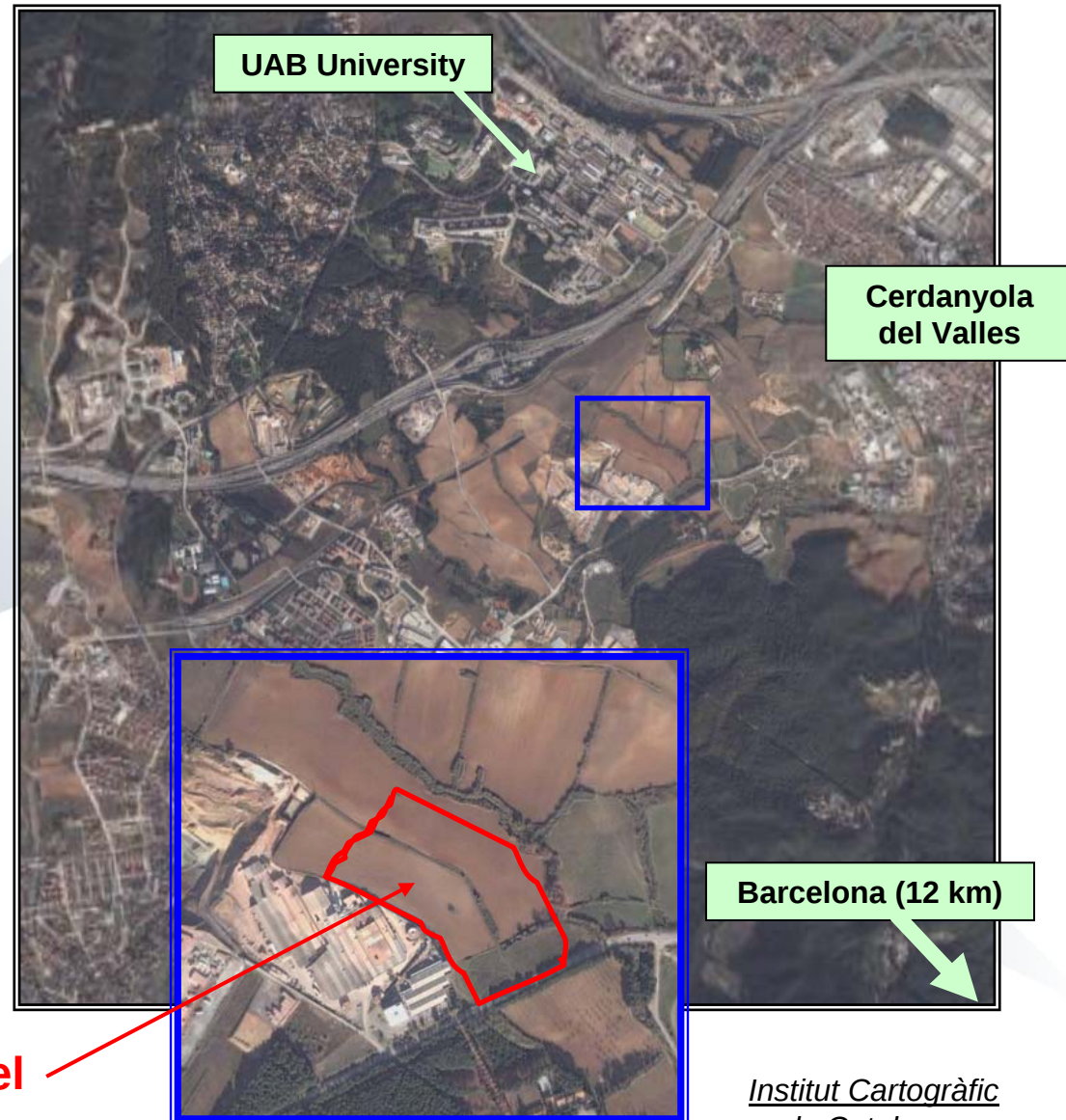
Outline

- ❖ ***The ALBA Project***
- ❖ ***Instrumentation***
- ❖ ***Alignment Procedures***
- ❖ ***Schedule***

■ Geographical Location



Barcelona (Catalunya)



UAB University

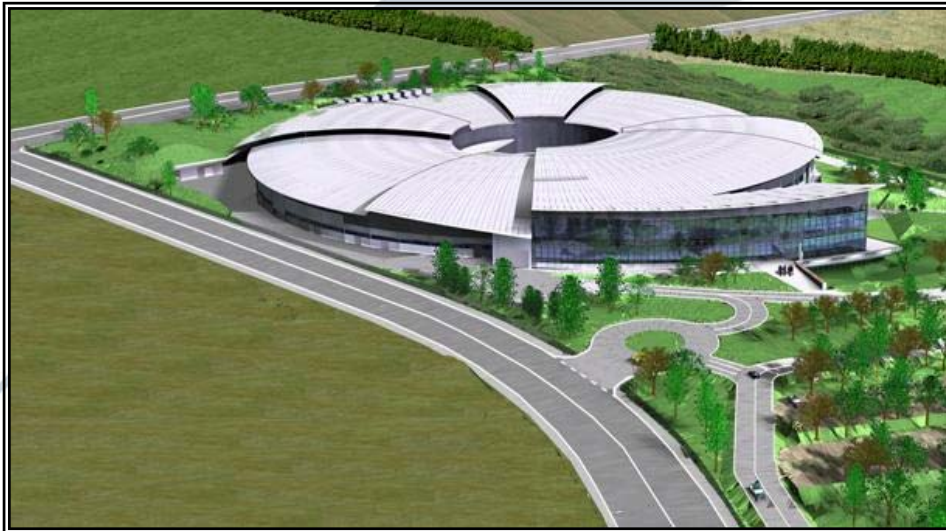
Cerdanyola
del Valles

Barcelona (12 km)

ALBA parcel

*Institut Cartogràfic
de Catalunya*

- 3D visualization



▪ Main parameters of the Synchrotron:

Linac:

<i>Energy</i>	100 Mev
<i>Emittance</i>	≤ 50 mm.mrad
<i>Length</i>	15 m

➤ *Injector:*

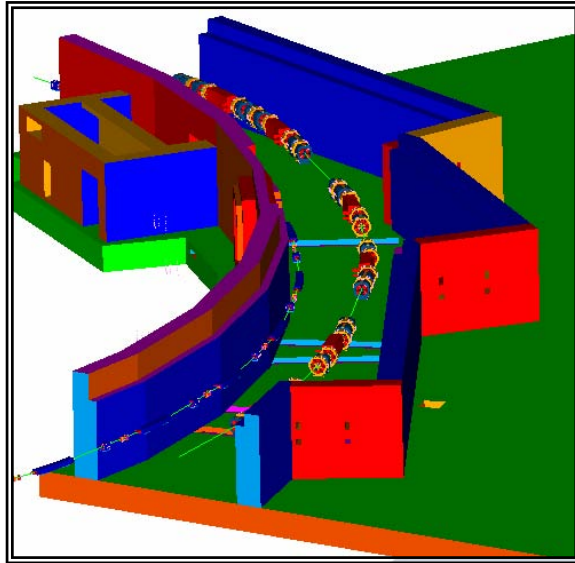
Booster:

<i>Peak energy</i>	3 Gev
<i>Circumference</i>	249.6 m
<i>Current</i>	2 mA

➤ *Storage Ring:*

<i>Emittance</i>	4.5 nm*rad
<i>Energy</i>	3 Gev
<i>Circumference</i>	268.8 m
<i>Maximum beam current</i>	400 mA

■ The ALBA machine:

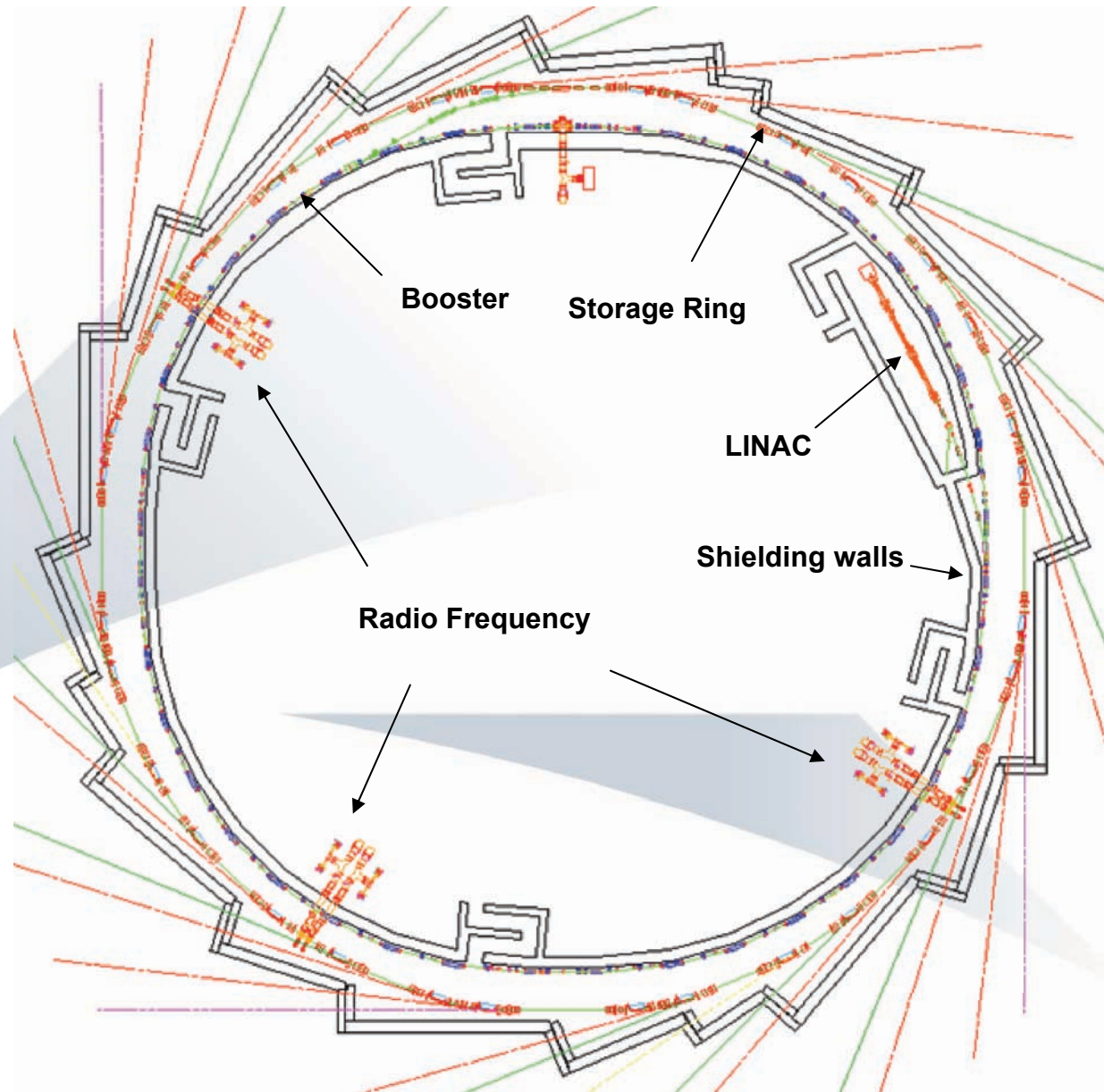


Tunnel Section

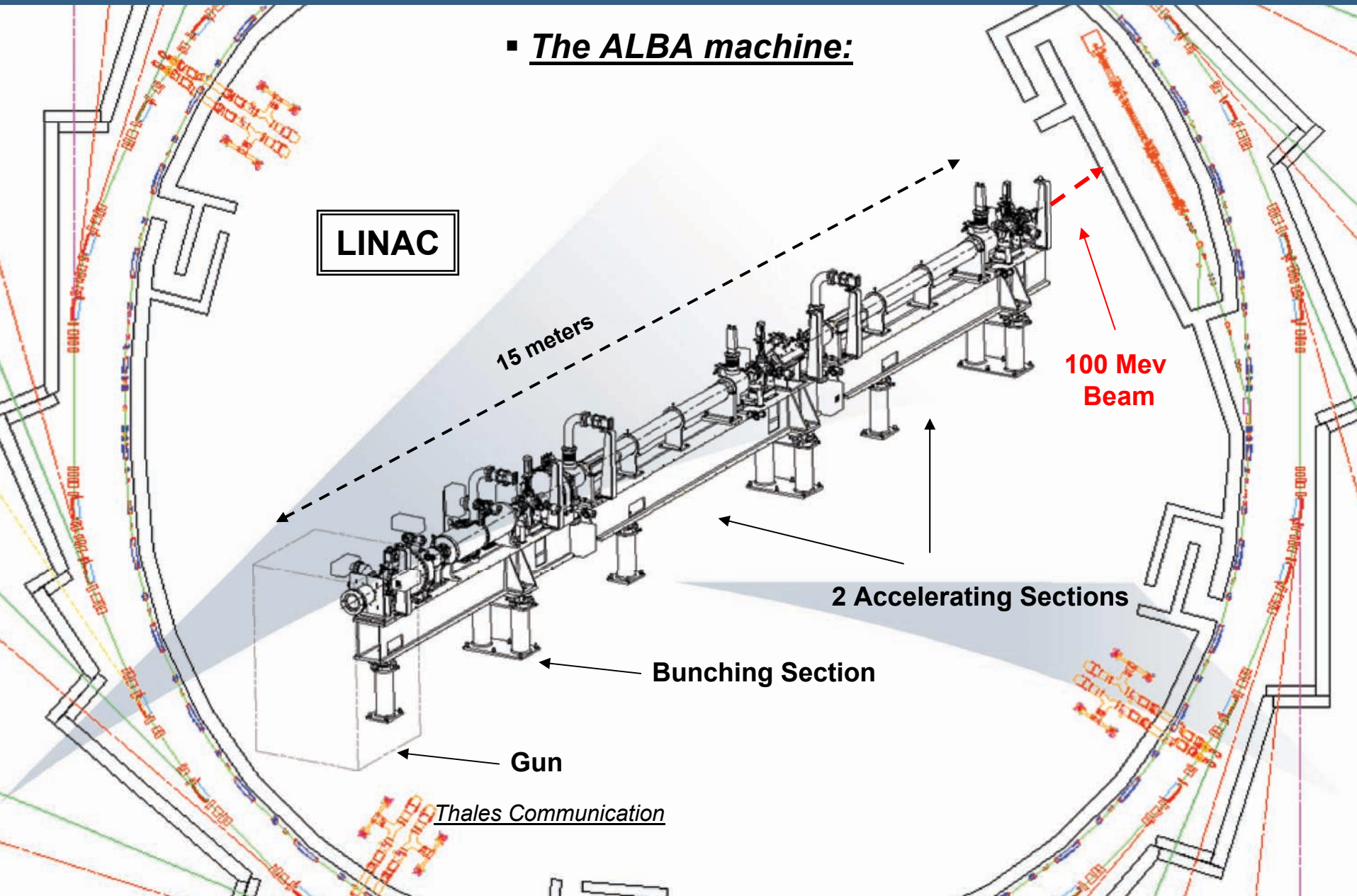
DBA structure lattice

straight sections:

4 of 8 meters
14 of 4.2 meters
8 of 2.6 meters

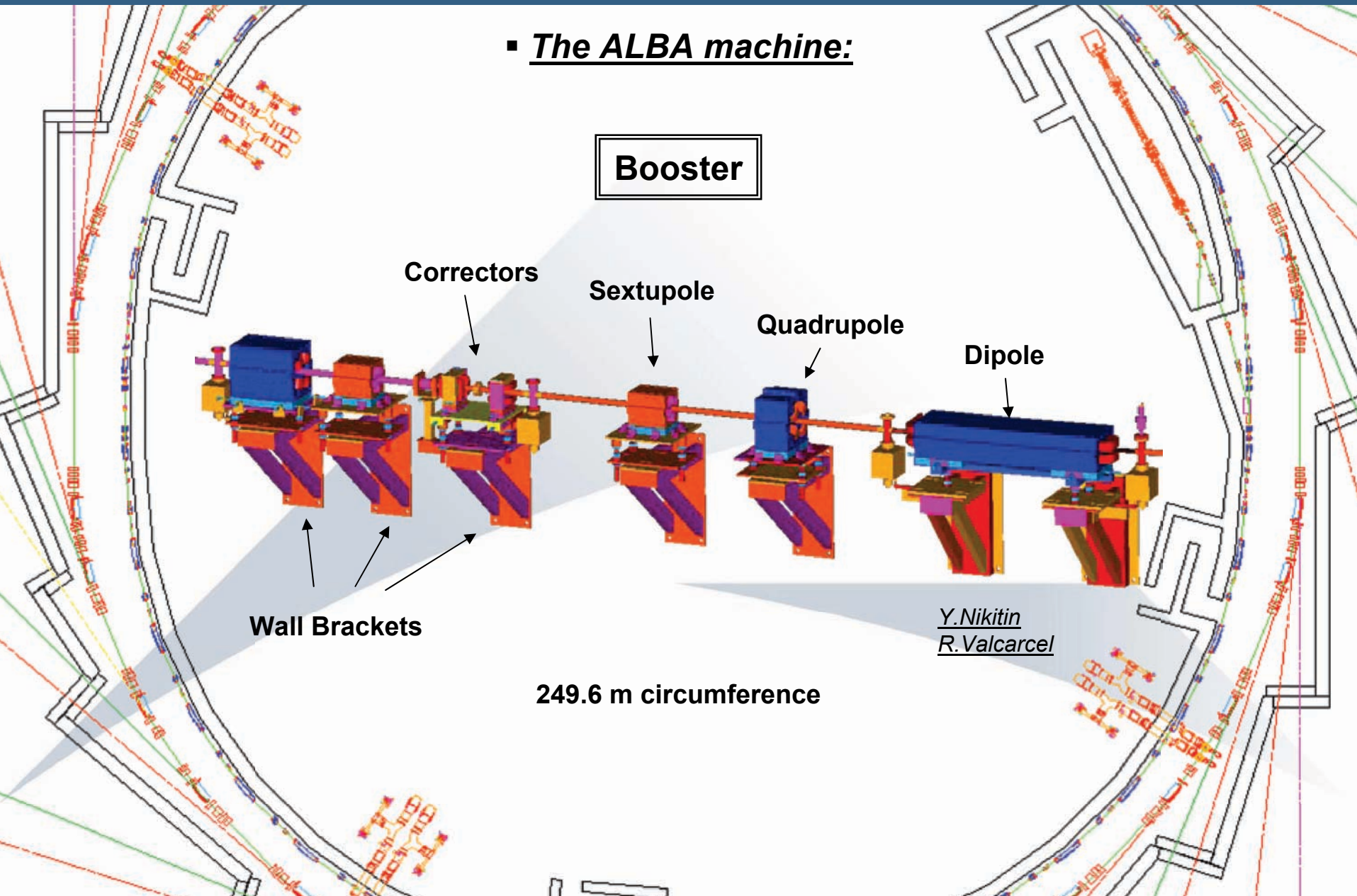


▪ The ALBA machine:



Thales Communication

▪ The ALBA machine:



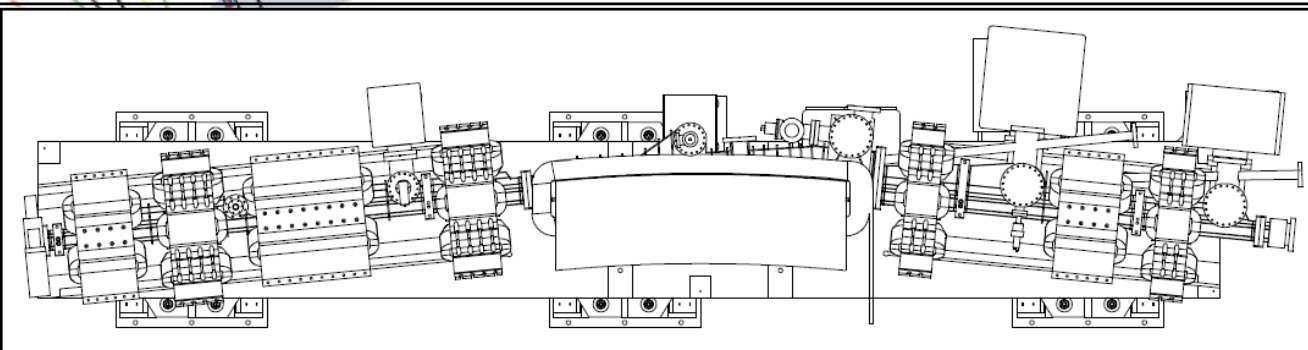
▪ The ALBA machine:

Fourfold symmetric
268.8 m circumference

6 types of girders

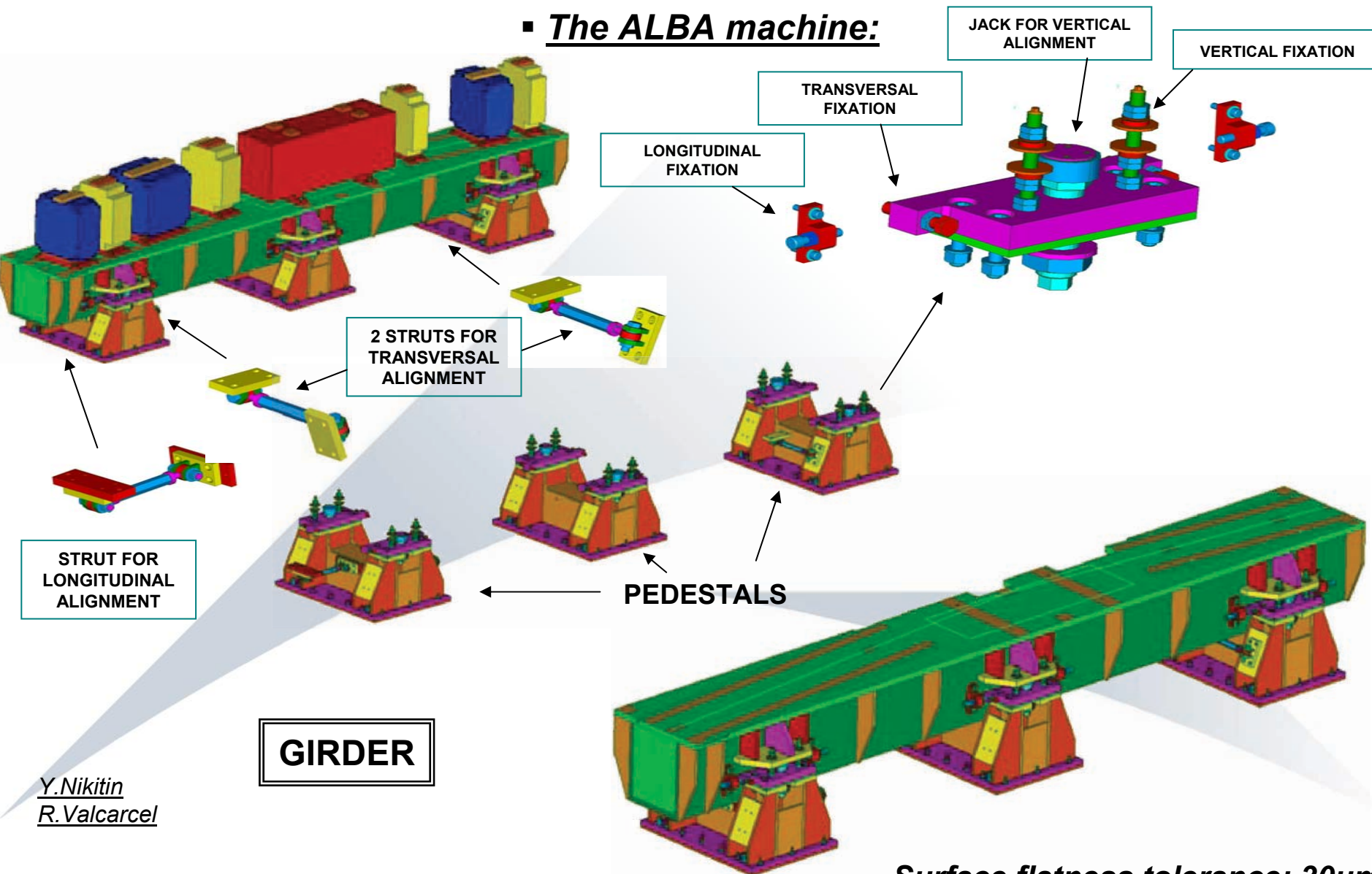
3 pedestals/girder

Storage Ring



Y.Nikitin
R.Valcarcel

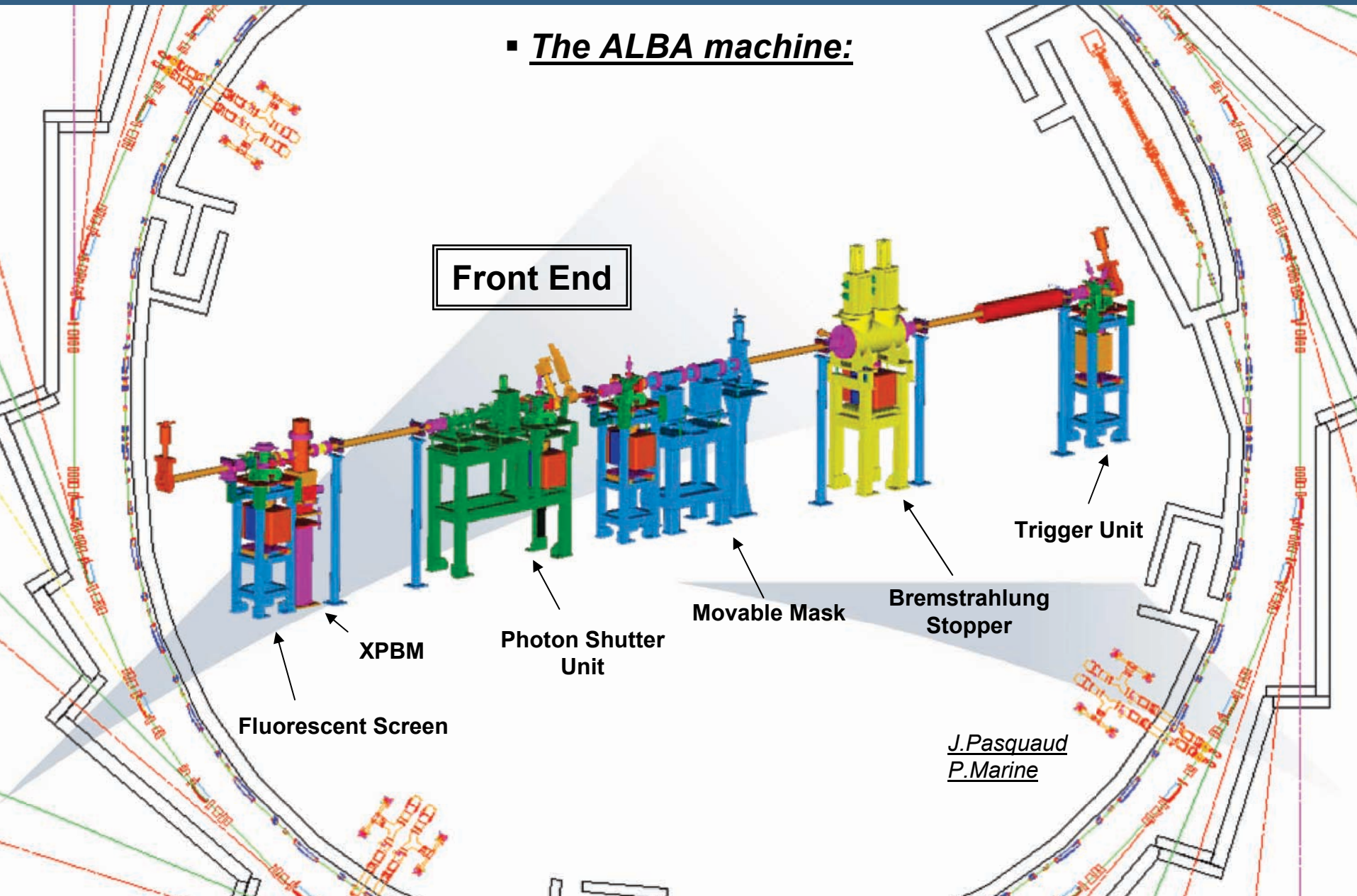
▪ The ALBA machine:



Y.Nikitin
R.Valcarcel

Surface flatness tolerance: 30µm

▪ The ALBA machine:



Front End

Trigger Unit

Bremstrahlung
Stopper

Movable Mask

Photon Shutter
Unit

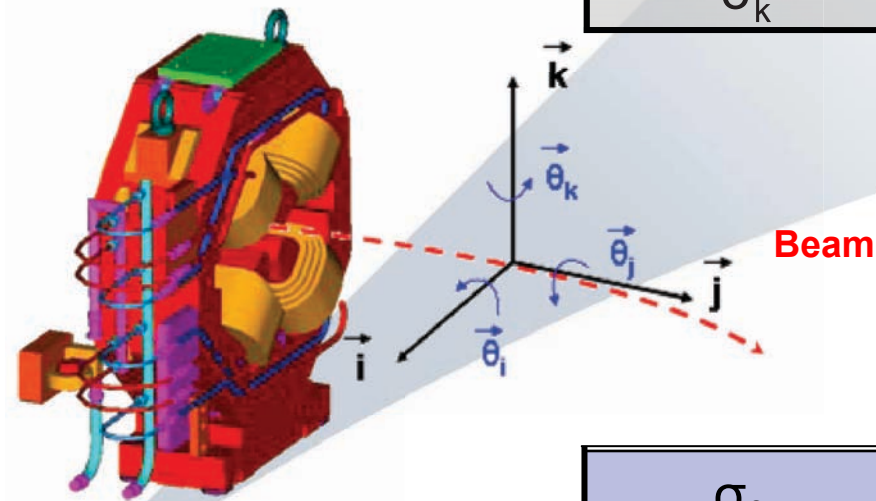
XPBM

Fluorescent Screen

J.Pasquaud
P.Marine

Storage Ring Positioning Specifications

	Combined bending magnet	Quad & Sext	Girder/Girder
σ_i	30 μm	30 μm	100 μm
σ_j	200 μm	200 μm	200 μm
σ_k	30 μm	30 μm	100 μm



	Combined bending magnet	Quad & Sext	Girder/Girder
$\sigma_{\theta i}$	--	--	--
$\sigma_{\theta j}$	500 μrad	200 μrad	250 μrad
$\sigma_{\theta k}$	--	--	--

our constraints:

- 270m machine.
- One single tunnel with both Booster and Storage Ring.
- Front End and Beam Lines encumbered.
- Geotechnical conclusions promising.
- Budget and Man Power.
- Fiducialization relying on accurately machined features.

Call for tender:

Lot n°2: Electronic Theodolite

Lot n°3: Laser Tracker

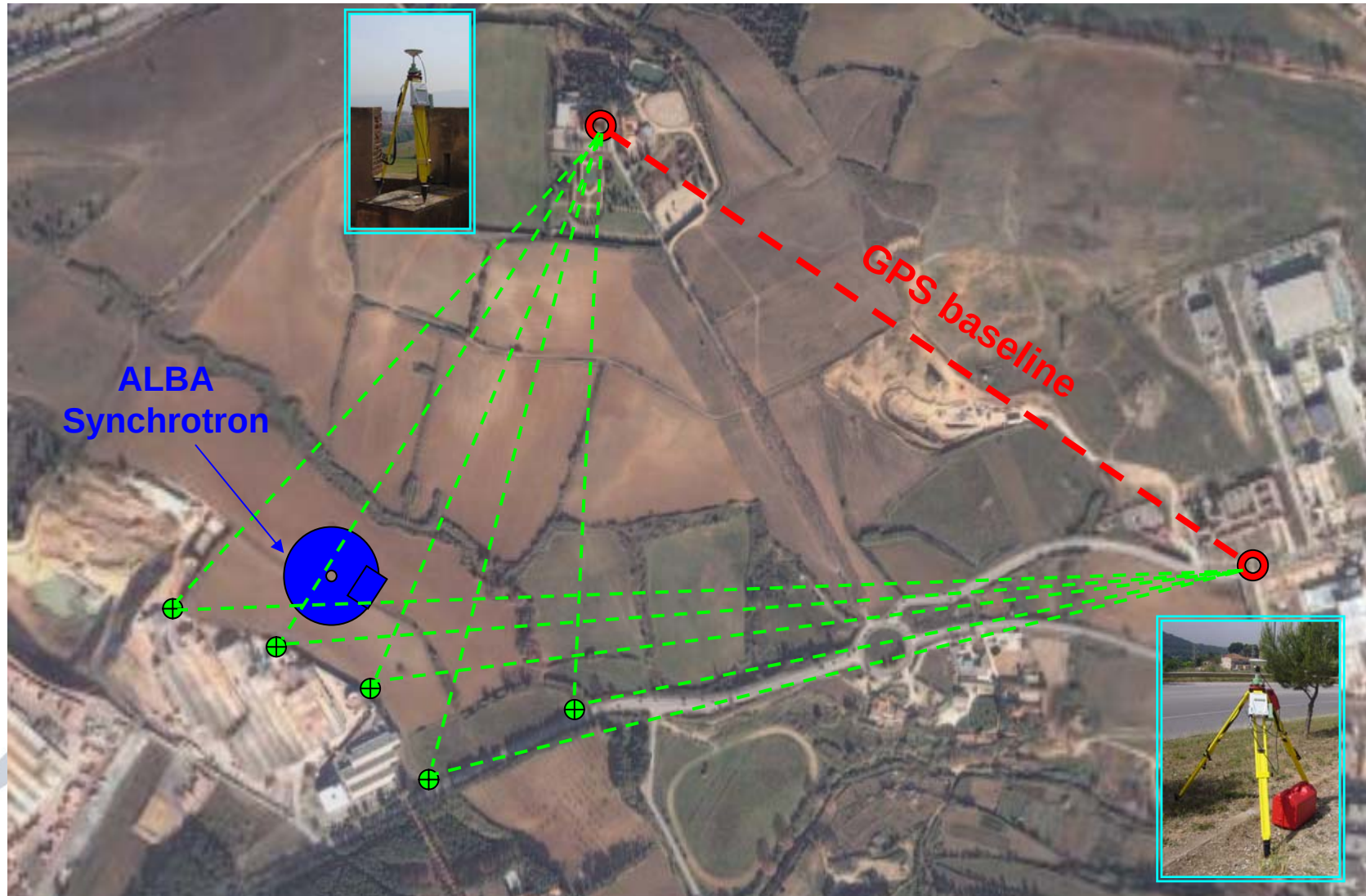
Lot n°1: Total Station

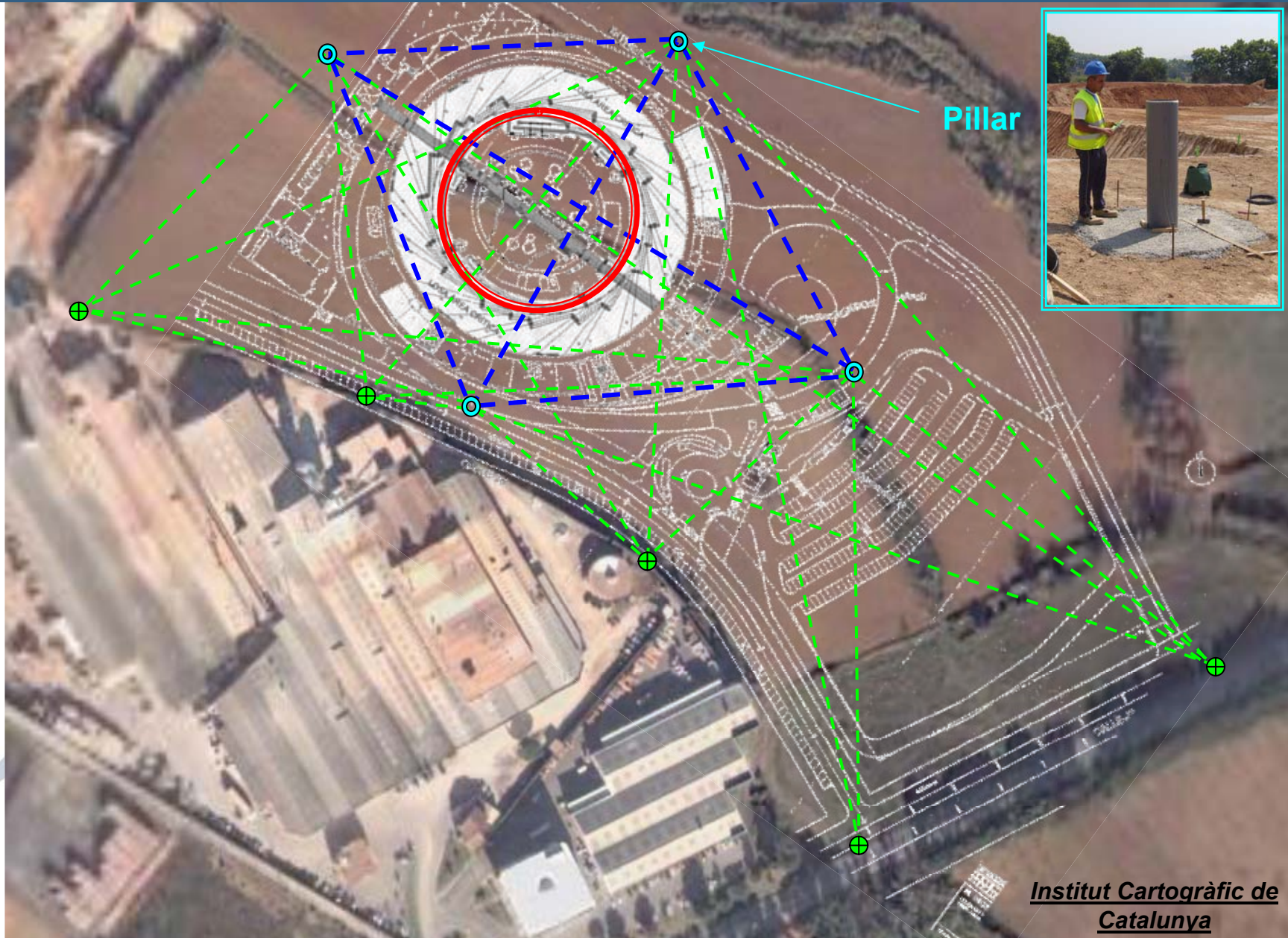
**Lot n°4: Portable 3D
Measurement Arm**

Lot n°5: Industrial Metrology Software

Others:

- Optical Level
- Digital Level





13 references marks on the slab

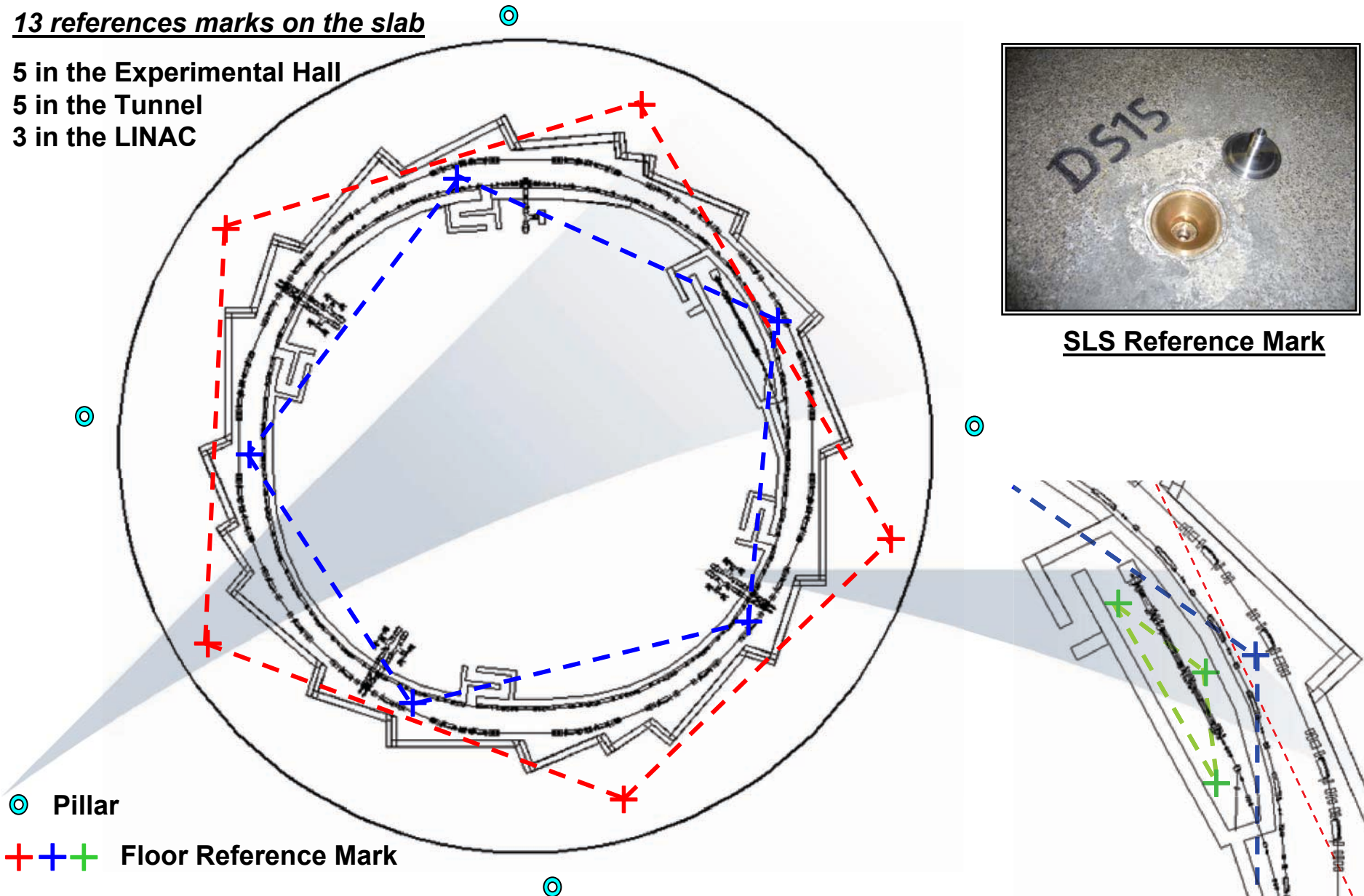
5 in the Experimental Hall

5 in the Tunnel

3 in the LINAC



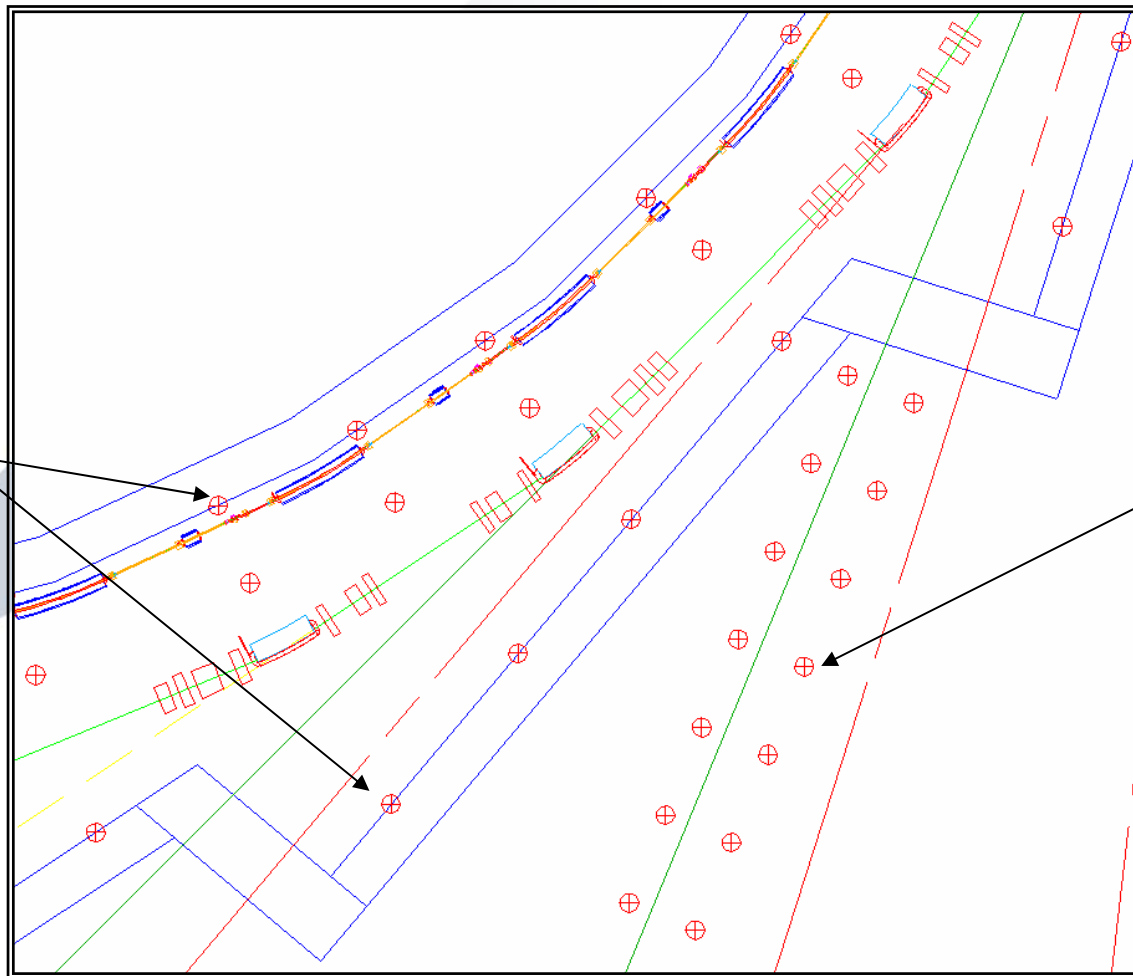
SLS Reference Mark



Alignment Network

Tunnel: 54 references on the ground
106 references on the walls

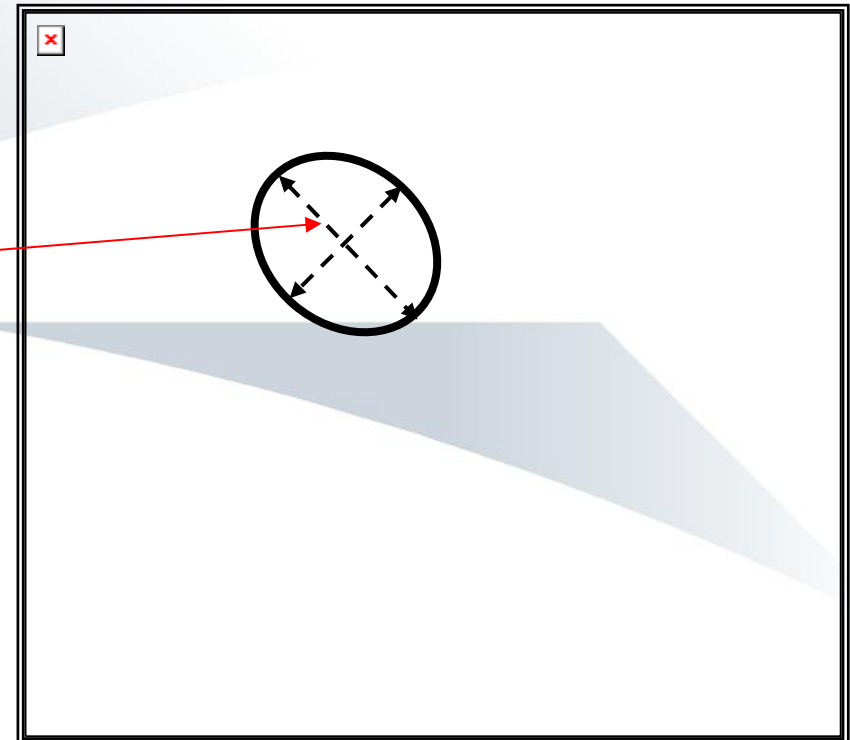
Experimental hall: 20 references / Beamline
(first on the slab, and then on the walls)



Network Simulation

- 54 floor references
- 106 wall references
- 53 stations
- at least 9 common points between 2 stations
- 12 reference points measured for each station

Maximum estimated radial
standard deviation: ± 0.08 mm

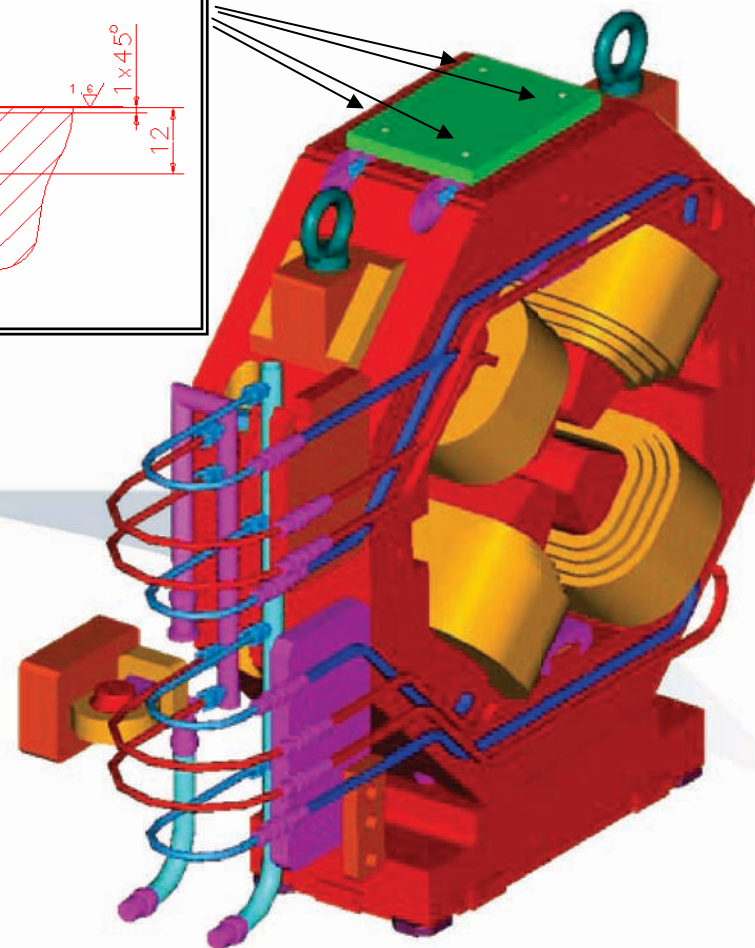
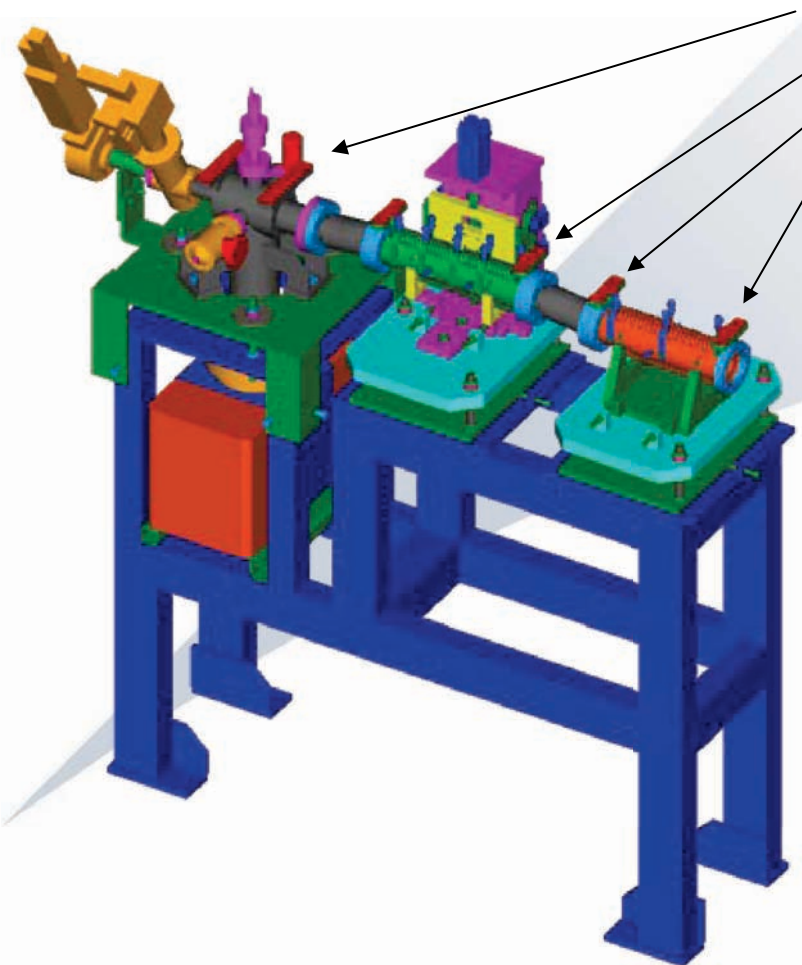
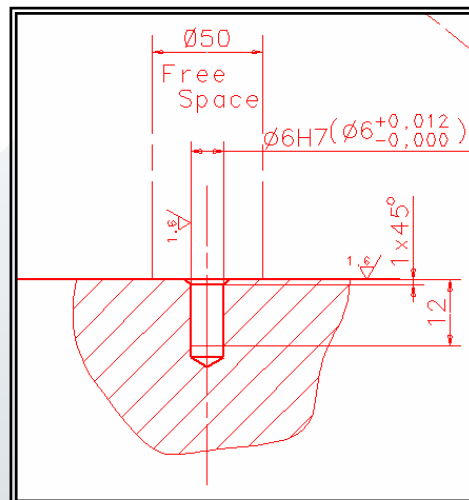


Standard error ellipse

F.Guilharretze - CABAB

Fiducialization

❖ one machined hole for receiving 1.5" reflector adapter.



2006

2007

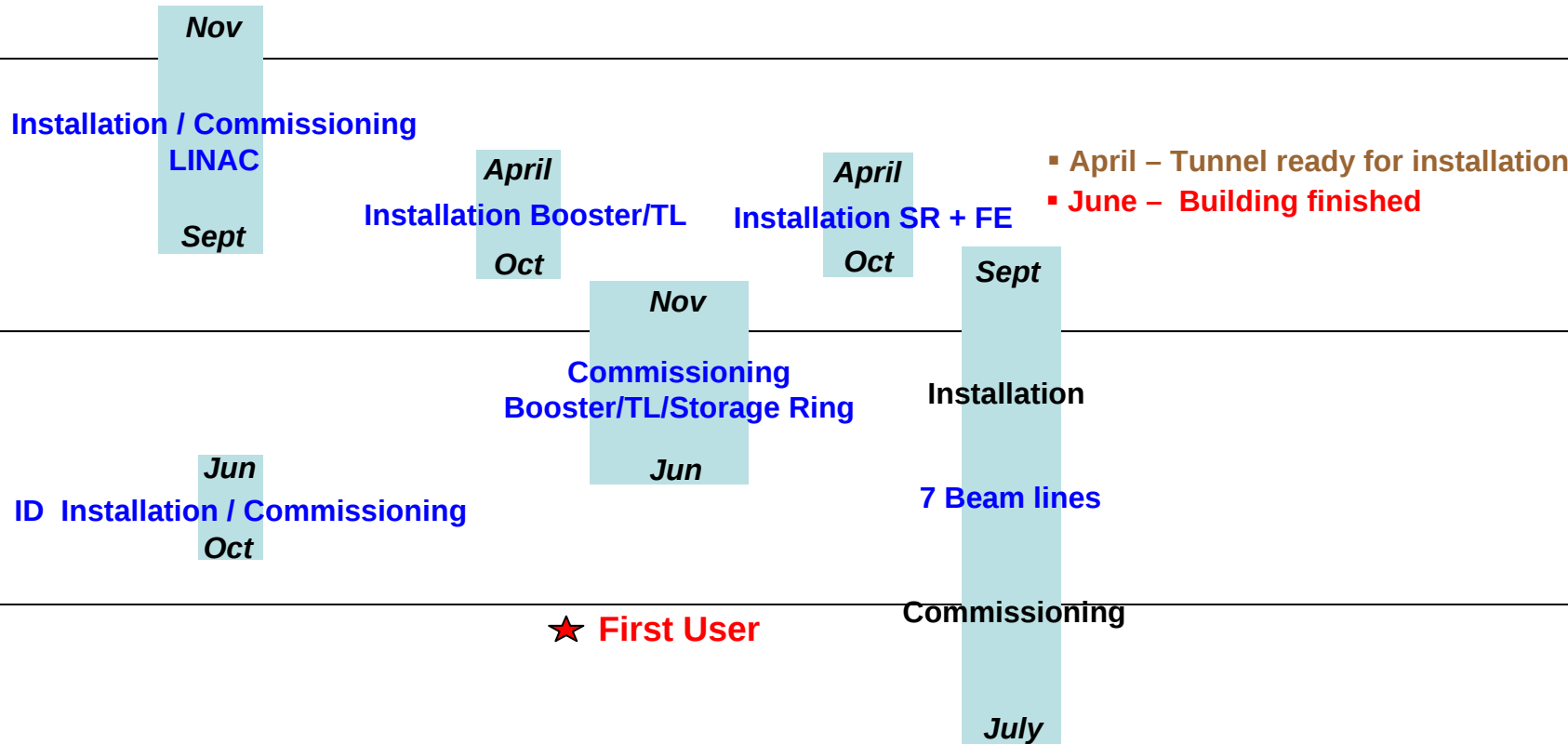
2008

2009

2010

▪ June – Start of the building construction and site urbanization

▪ Feb – Slab ready for installation of Alignment Reference Network



➤ Next Steps

- ❖ Oct 2006 – Tendering Closed
- ❖ Dec 2006 – Delivery of the Instrumentation
- ❖ 2007....

Administration

- Hiring of a Junior Topographic Engineer

Workshop

- Training with Instrumentation
- Checkout of the girder prototype
- Magnets Fiducialization

Site

- Installation/Measurement of the Alignment Network
- Preparation of the Tunnel for Installation (drilling holes, marks...)
- LINAC installation





Thanks for your attention.

