First considerations for beam stability at ALBA

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ALBA Team

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ALBA Project

ALBA Status

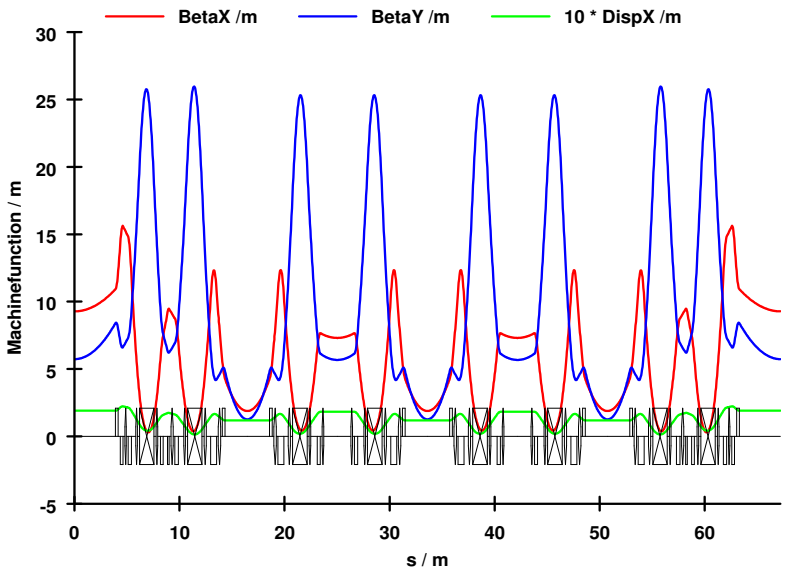
- Recruiting going on (director and section heads appointed, ~40 people).
- Site selected, study of the ground and vibrations under way.
- Contract negotiations for the design of the building and facility under way.
- Lattice almost fixed.
- Not much work on beam stability yet, but now is the time to think. We can save a lot of work and pain later if we take the right decisions now.

Timetable

Site Urbanisation	01.2005 - 01.2006
Building construction	01.2006 - 07.2007
Linac Call for tender Construction Installation and commissioning	 01.2005 - 06.2005 07.2005 - 07.2007 08.2007 - 12.2007
Booster Call for tender for components Construction Installation and commissioning	 03.2005 - 12.2005 2006 - 2007 01.2008 - 09.2008
Storage Ring Call for tender for components Construction Installation	 02.2005 - 12.2005 2006 - 2007 04.2008 - 10.2008
Storage Ring Commissioning	11.2008 - 06.2009
Beam Lines Commissioning	07.2009 - 04-2010
Beam for users	05.2010

Optics

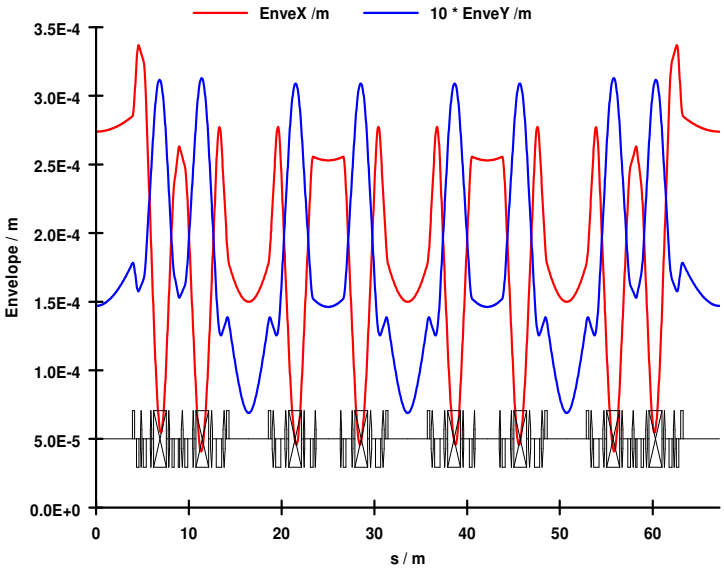
- DBA-like, 16 cell.
- The dipole has a large quad component.
- 4x8 m Long
- 12x4.1 m Med
- 8x2.1 m Short
- ~4 nm-rad



Beam sizes

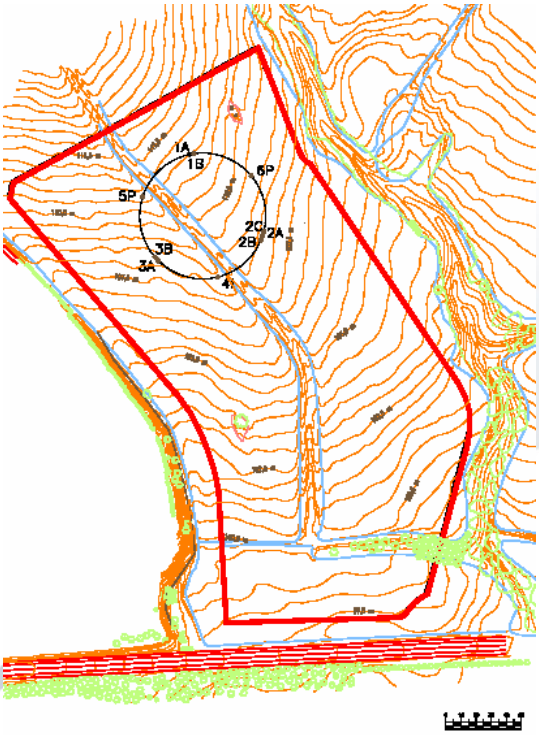
- Our scientific case puts priority in the spectral flux density, requiring small cross section at the IDs.

•The last step of the lattice design is to find the right compromise between dispersion in the straight sections, reduction of the emittance, chromaticity correction and beam size.



The site

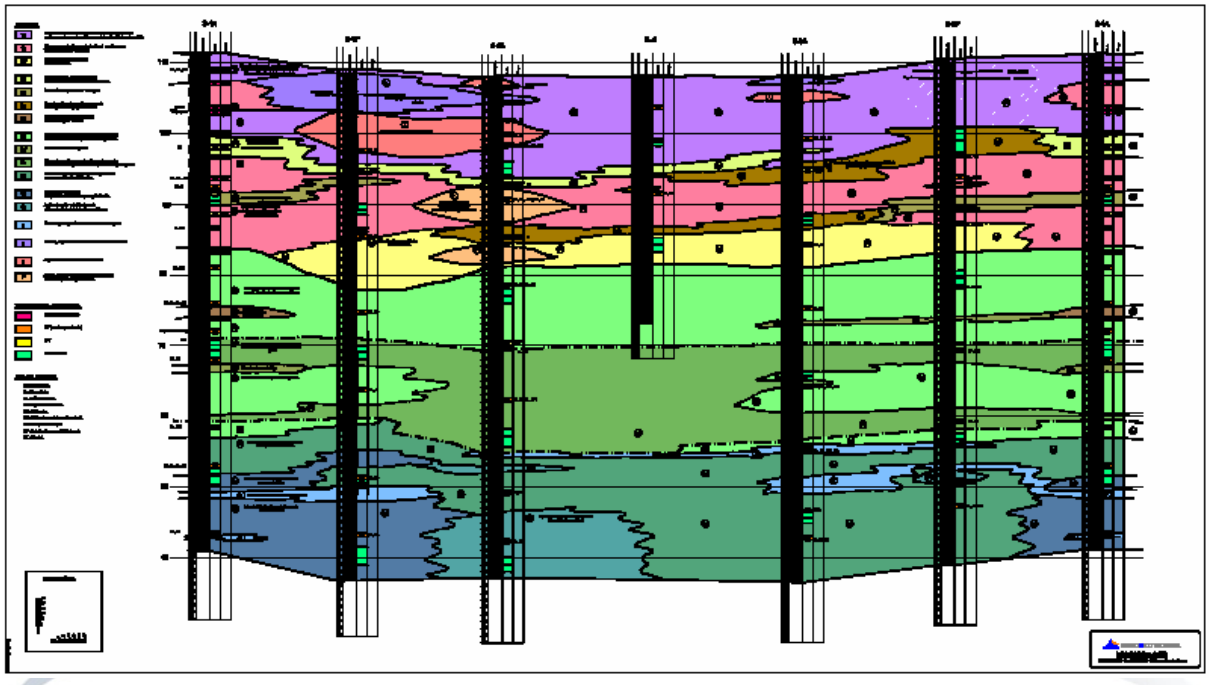
Site Study



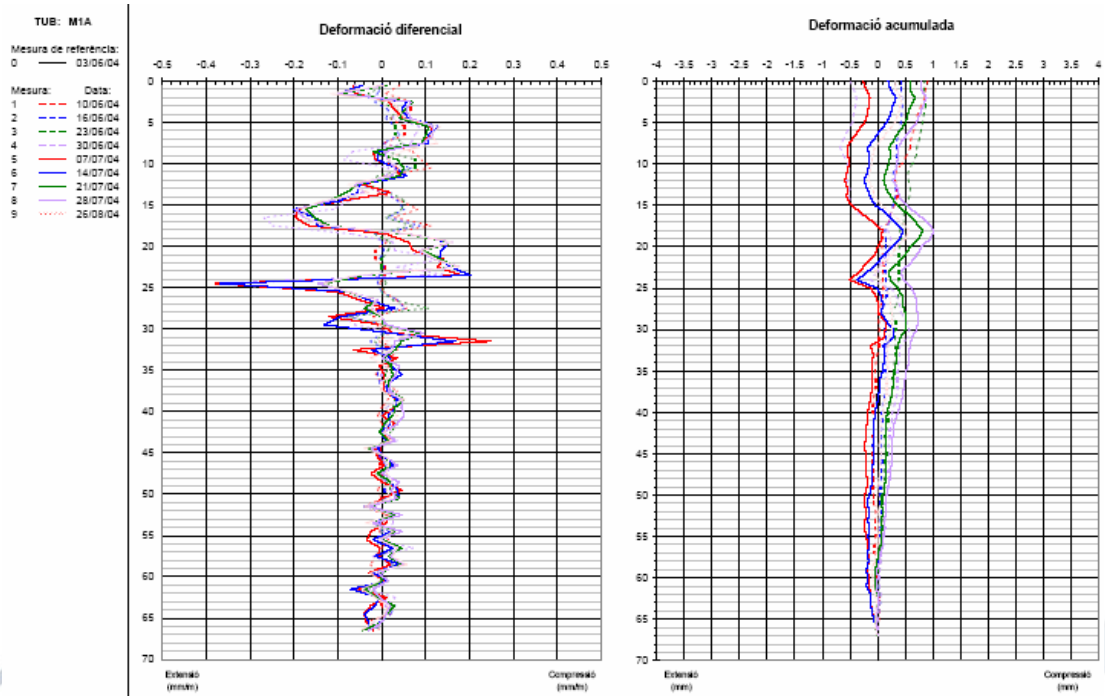
Boring	Depth (m)	Instrumentation
1A	70	Micrometer
2A	70	Micrometer
3A	70	Micrometer
4I	35	Slope indicator
5P	70	Extensiometer
6P	70	Extensiometer
1B	14,21,47,60	Piezometer
2B	15,23,45,65	Piezometer
3B	14,21,45,58	Piezometer

- Remote data acquisition
- Periodically crosscheck manual/ remote
- Monthly reports

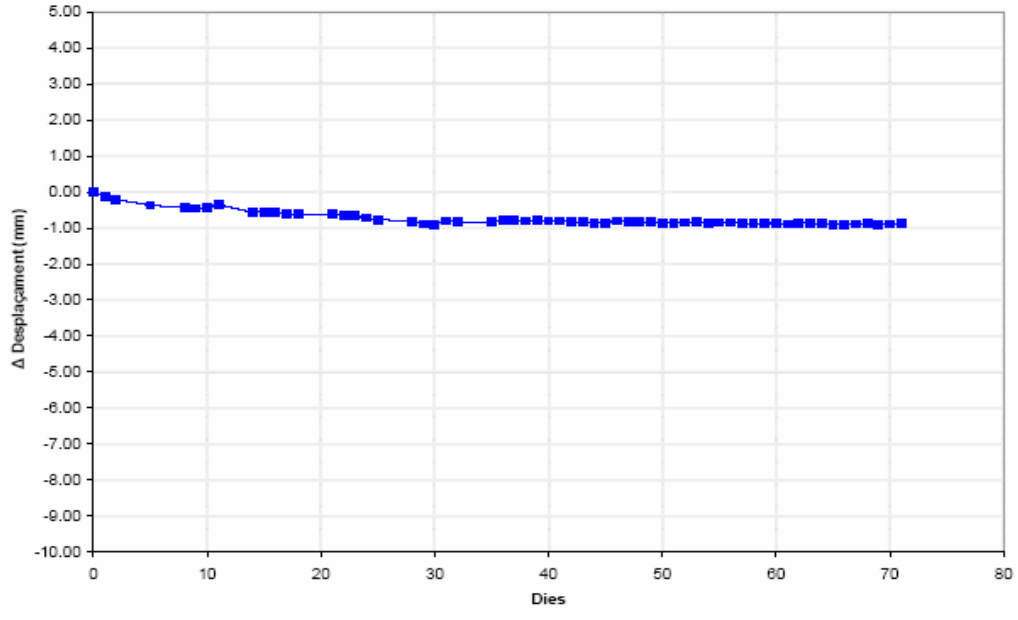
First results of the site study



Micrometer 1



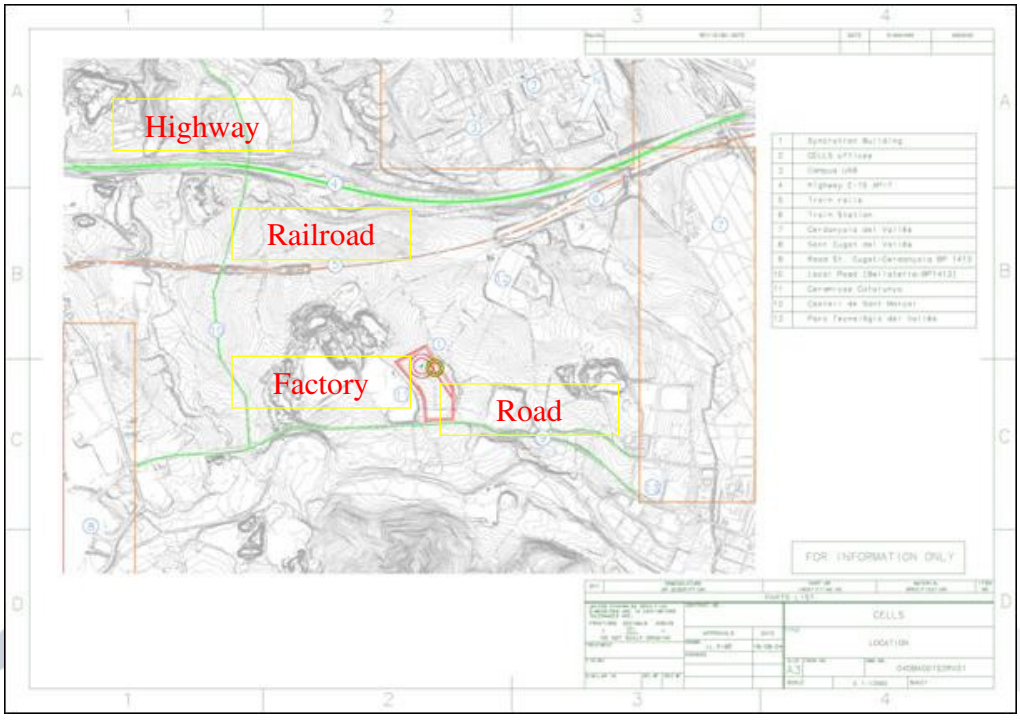
Extensometer 5P



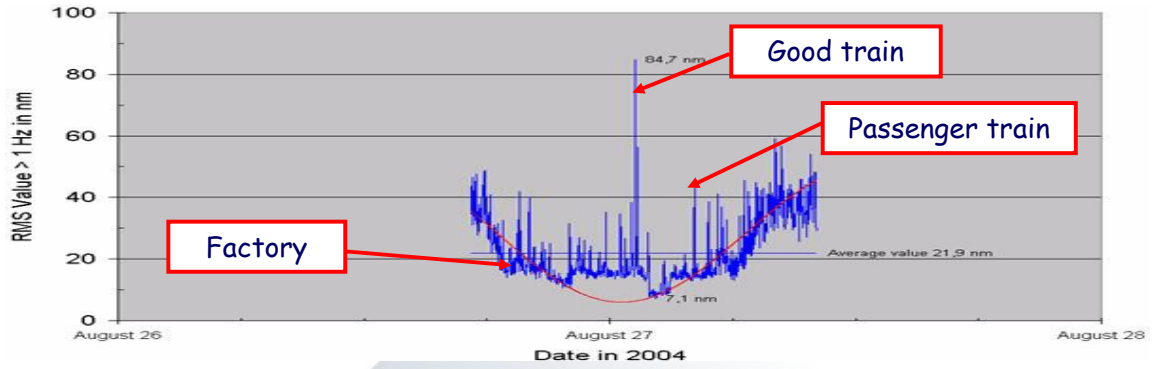
Conclusions

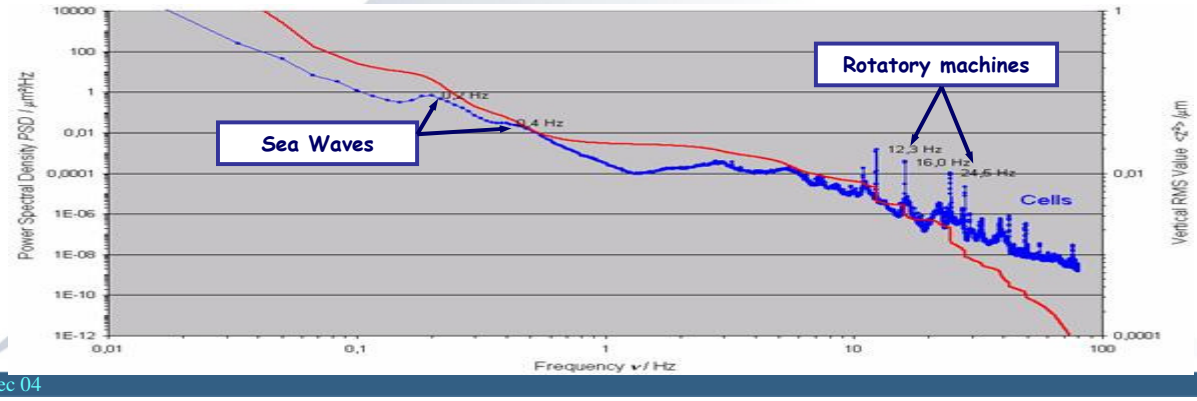
- Two phases study:
  - Soil characterization + 3 months measurements
- Report due soon
- Long period Monitoring
  - Report due August 2005
- Undisturbed site.
- Geological characteristics as expected.
- Main components clay, limes and marl, no significant layers of sands.
- Predictable behavior of the components of the soil.
- No significant differential movements detected up to now.

Very preliminary vibration study

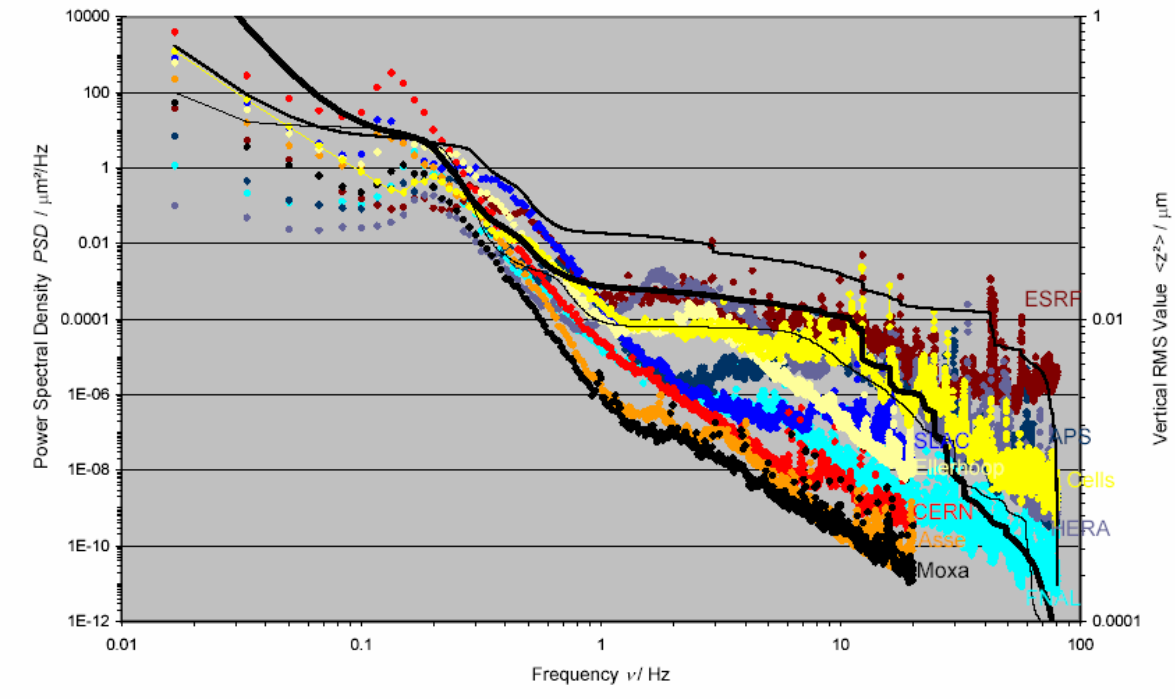


Some results





Comparison



Conclusions

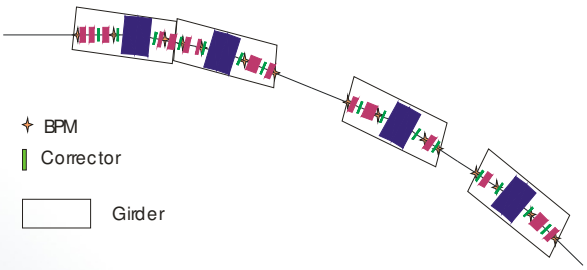
- First results do not show anything dramatically wrong BUT:
  - Short measurement period.
  - Industrial activity in the area slowed down at the time of the measurements.
  - Home made noise will increase the vibration.
- Longer term measurement campaign is starting this December.

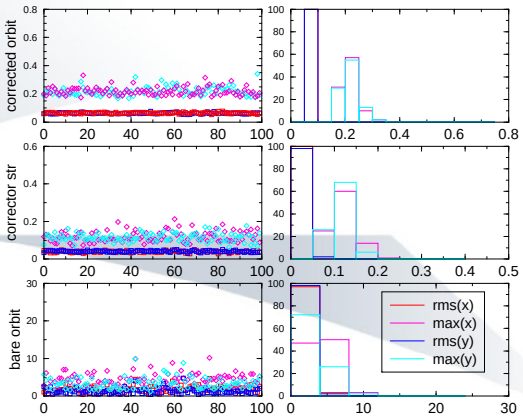
The Site. Conclusions

- The proposed site is not the ideal location for a light source. The reasons for selecting it were not technical.
- With the information we have today it is good enough for the required purpose.
- The analysis of vibrations is the critical part.
- The preliminary result do not show any factor that will prevent the installation of a light source on the site at a reasonable cost.

Alignment, girders and correction system

- Magnets in girders.
  - Bending in the same girder as the other magnets.
- Correctors in sextupoles.
- As many BPMs as possible, but limited in position and number due the small circumference and compact arrangement.
- Requiring good alignment (30 μm for elements in girders, 100 μm for girders).





Open questions

- Correctors: Extra coils in the sextupoles or in the quadrupoles.
- Girders: How many degrees of freedom they really need.
- Temperature control:
  - Same temperature in tunnel and experimental hall or different ones?
  - Temperature stability in the tunnel.