Welcome
and
Introduction to the target of the workshop

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Synchrotron SOLEIL

WELCOME

TO THE FREQUENCY MAP ANALYSIS WORKSHOP

On behalf of the Synchrotron SOLEIL team, the Organizing and the Scientific Committees

ORGANIZING COMMITTEE

A. Nadji
L. Nadolski
S. Podgorny

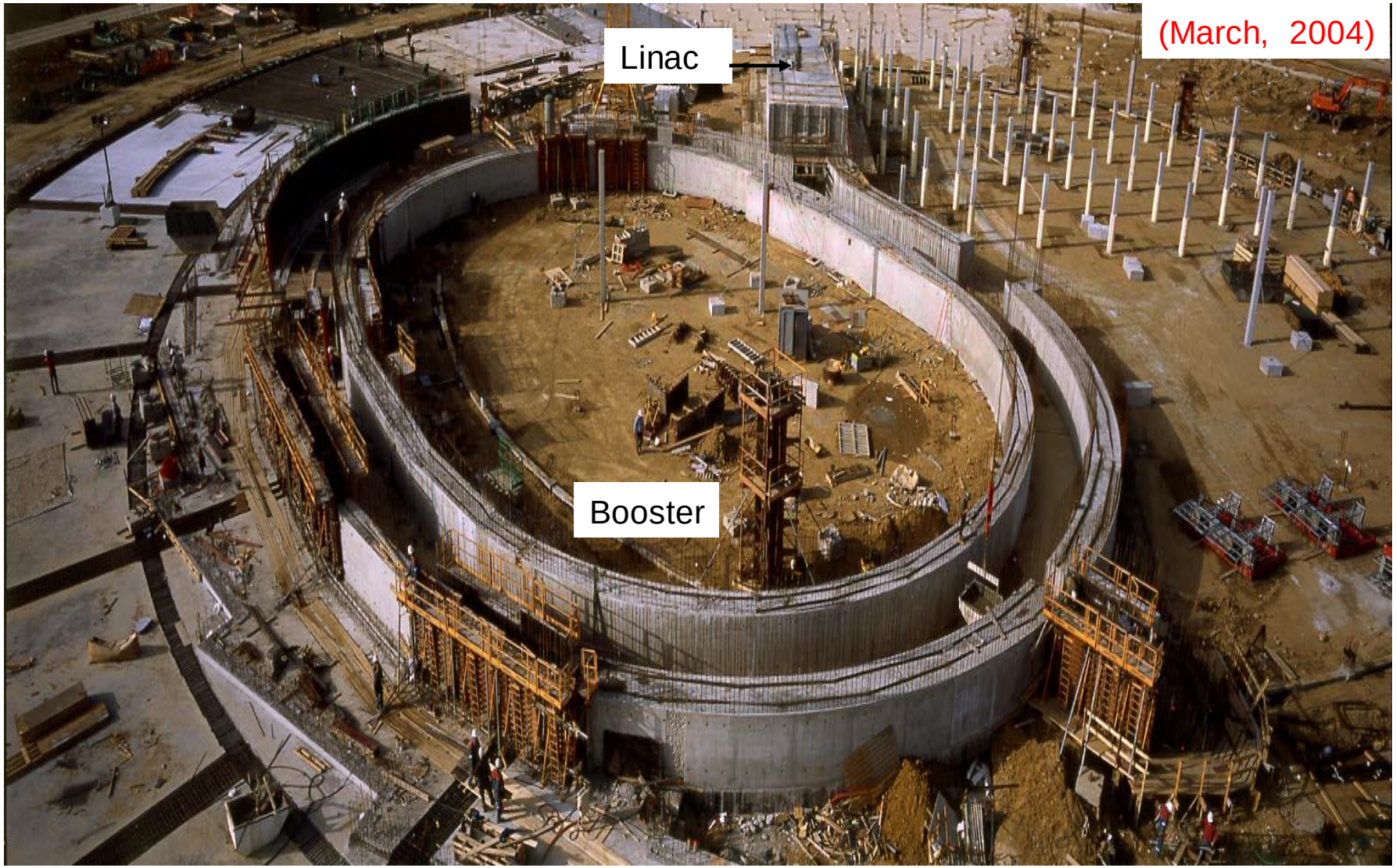
SCIENTIFIC COMMITTEE

P. Kuske (BESSYII)
J. Laskar (IMCCE)
A. Nadji (SOLEIL)
Y. Papaphilippou (ESRF)
D. Robin (ALS)

The workshop is hold in Orsay at LURE

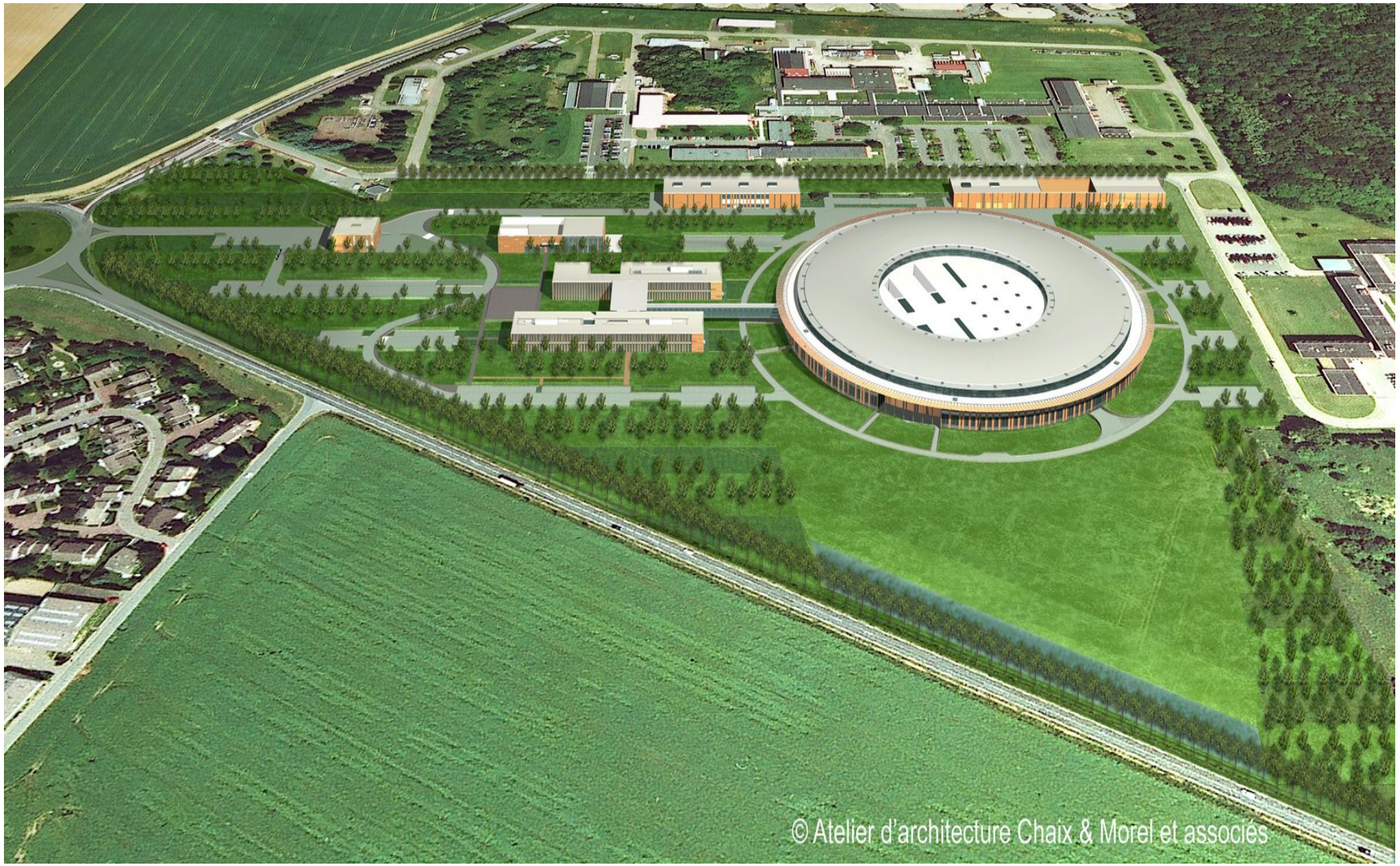
December, 19th 2003: definitive shut down of the LINAC, DCI and Super-ACO (machines in operation at LURE over a period of 30 years)

The Synchrotron SOLEIL being under construction



595 piles, accelerator tunnel and experimental hall slabs…

The Synchrotron SOLEIL in a near future



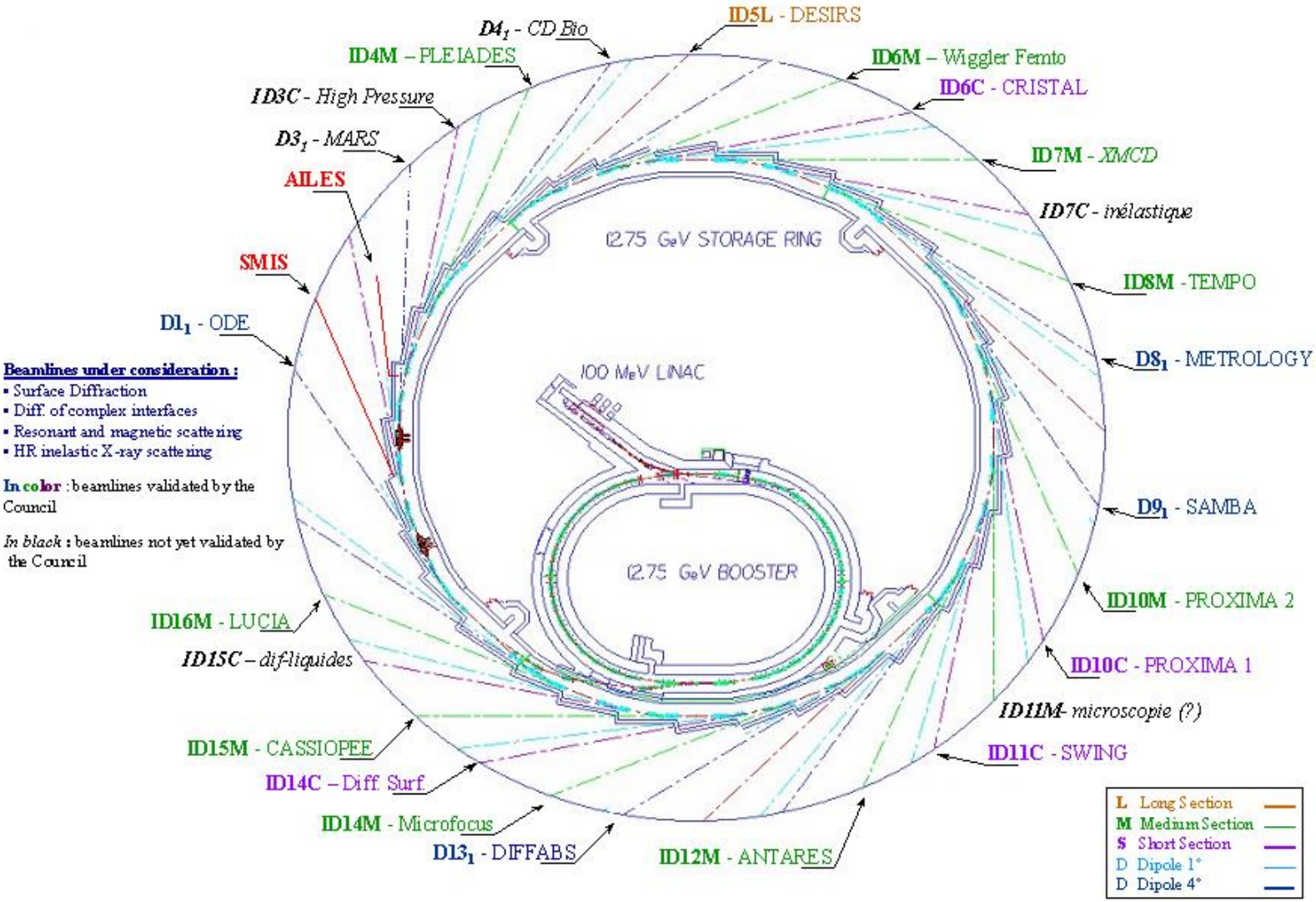
SOLEIL

- A third generation synchrotron radiation source :
  - operating at 2.75 GeV
  - with 10 (2006) and 24 (2009) beamlines

    43 possible beamlines, 21 from undulators
  - with the highest performance as possible

    2500 users per year (25 % foreigners)
- Established on the "Plateau de Saclay"
- With the status of a non-trading company (cf ESRF)
  - owners: CEA 28 %, CNRS 72 %
  - partners: Regional Council of Ile de France, General Council of the Essonne department
  - open to foreign partnership (Spain (2.5%), …)

Photon Beam Lines



SOLEIL main characteristics

Energy	**2.75 GeV**
Circumference	**354 m**
Number and length of straight sections	**4 x 12 m** **12 x 7 m** **8 x 3.6 m**

Multibunch mode current	**500 mA**
Lifetime	**18 h**
8 bunch mode current	**90 mA**
Lifetime	**16 h**

Transverse beam dimensions:

Location	σ_x (μm)	σ_z (μm)
Long straight section	270	17
Intermediate straight section	182	8
Short straight section	388	8
BEND	61	43

Target of the Workshop

- ✓ Make the Frequency Map Analysis known to those who never used it
- ✓ Gather people to share common experience on the usefulness of FMA at the design level of a lattice
- ✓ Experimental implementation of the FMA and experimental maps
- ✓ Effectiveness of FMA in understanding the limits coming from single particle non-linear dynamics (injection efficiency, dynamic aperture, momentum aperture, electron Touschek scattering, resonances,…).
- ✓ Limits of FMA, encountered difficulties and possible improvements
- ✓ Alternative techniques to study and understand beam dynamics
- ✓ Importance of a good model representing the realistic machine
- ✓ …

Discussion and exchange are therefore of great importance!

What is the Aim ?

- The main aim is a more complete modeling of the machine and a better understanding of the single particle dynamics.

- Although there is a good qualitative understanding of the particle loss mechanisms, there is still not a good quantitative understanding

- Quantitative knowledge concerning (specific) machine errors and unexpected nonlinear fields is essential.

- Advances in tracking with maps have improved the lattice design process, providing a global footprint of the beam dynamics.

- The FMA as a Quality Factor? The FMA as an optimization tool?

  - Full quasiperiodic decomposition
  - Diffusion
  - …

- 4D versus 6D optimization

- The FMA in the control room as an interactive on-line monitor

  - What kind of additionnal information on nonlinear motion can we extract from maps measurements ?
  - Use of harmonic sextupoles
  - Decoherence implication for analysing data
  - Acquisition time for the experimental frequency map

Attendee List

Attal, Maher (SESAME)
Bartolini, Ricardo (DIAMOND)
Belgroune, Mahdia (SOLEIL)
Brunelle, Pascale (SOLEIL)
Denard, Jean-Claude (SOLEIL)
Di Mitri, Simone (ELETTRA)
Emery, Louis (APS)
Farvacque, Laurent (ESRF)
Filhol, Jean-Marc (SOLEIL)
Franchetti, Giuliano (GSI)
Hofmann, Ingo (GSI)
Koutchouk, Jean Pierre (CERN)
Kuske, Peter (BESSYII)
Laskar, Jacques (IMMCE)
Level, Marie-Paule (SOLEIL)
Loulergue, Alexandre (SOLEIL)
Munoz, Marc (SLS)
Nadji, Amor (SOLEIL)
Nadolski, Laurent (SOLEIL)
Nagaoka, Ryutaro (SOLEIL)
Papaphilippou, Yannis (ESRF)
Robin, Dave (ALS)
Ropert, Annick (ESRF)
Schmidt, Franck (CERN)
Tanaka, Hitoshi (Spring-8)
Tordeux, Marie-Agnès (SOLEIL)
Tosi, Lidia (ELETTRA)

27 participants 10 from SOLEIL and 17 from other labs 13 different labs

26 experts on beam dynamics in particle accelerators around

one expert on planetary motion and « father of the FMA »