OVERVIEW OF THE STATUS OF THE SOLEIL PROJECT

Content

• SOLEIL main characteristics

• Specificities and innovative aspects

• Commissioning progress

• Conclusions

Jean-Marc FILHOL
on behalf of the SOLEIL team
Acknowledgements

Commissioning team: A. Nadji, JC Besson, P Brunelle, L Cassinari, ME Courpie, C Daveran, JC Denard, P Gros, C Herbeaux, JF Lamarre, MP Level, P Lebasque, A Lestrade, A Loulergue, A Madur, P Marchand, L Nadolski, R Nagaoka, B Pottin, JB Pruvost, F Ribero, MA. Tordeux

Operator team: R Cuoq, A Bence, P DaSilva, X Deletoille, D Pereira, G Roux, S Petit

Magnetism and Insertion Device group
RF Group, Linac Group, Diagnostic group
Vacuum group
Alignment group

Mechanical and engineering group: JL Marlats et al.

Electronics and Computer Groups: P Betinelli, A Buteau et al.

Infrastructure group: P Eymard, S Mzah et al.

Safety group
• Electron energy : 2.75 GeV

• Extended spectral range :
  From UV (5 eV) up to hard X-Rays (15 KeV)

• 3rd generation => Many insertion device beamlines
  21 straight sections available (29% of ring circ.)

• High brilliance (10^{20}) in the soft X-ray range :
  => small emittance and high intensity

• Best achievable beam position stability
24 Beamlines

22 Beamlines approved by the Council + 2 beamlines to be defined:
16 on insertion devices and 6 on bending magnets

Spectral range equally shared:
50% below 1.3 keV and 50% above

Phase 1: 11 beamlines being built ⇒ open to external Users in 2007
6 on insertion devices and 3 on bending magnets + 2 IR

Phase 2: 7 beamlines open to external Users in 2008
5 on insertion devices and 2 on bending magnets
+ 4 beamlines on ID open to external Users in 2009

5 Straight sections still free + 15 bending magnet beamports!
## Storage Ring parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>2.75 GeV</td>
</tr>
<tr>
<td><strong>Circumference</strong></td>
<td>354 m</td>
</tr>
<tr>
<td><strong>Number and length of straight sections</strong></td>
<td>4 x 12 m, 12 x 7 m, 8 x 3.6 m</td>
</tr>
<tr>
<td><strong>Horizontal emittance</strong></td>
<td>$3.7 \times 10^{-9}$ m.rad</td>
</tr>
<tr>
<td><strong>Vertical emittance</strong></td>
<td>$37 \times 10^{-12}$ m.rad</td>
</tr>
<tr>
<td><strong>Energy spread</strong></td>
<td>$1.16 \times 10^{-3}$</td>
</tr>
<tr>
<td><strong>Multibunch mode Lifetime</strong></td>
<td>500 mA, 18 h</td>
</tr>
<tr>
<td><strong>8 bunch (30 ps every 148 ns)</strong></td>
<td>90 mA, 18 h</td>
</tr>
<tr>
<td><strong>Lifetime (10% coupling)</strong></td>
<td></td>
</tr>
</tbody>
</table>
Storage Ring parameters

Horizontal tune $Q_x : 18.2$
Vertical tune $Q_z : 10.3$
Natural Chromaticities $\xi_x/\xi_z : -53/-23$
Momentum compaction $\alpha_1 / \alpha_2 : 4.4 \times 10^{-4} / 4.5 \times 10^{-3}$

RF Frequency: $352.202 \text{ MHz}$
Harmonic number (max number of bunches) $416$
Maximum RF Voltage: $4.8 \text{ MV}$
Energy loss per turn (with ID’s): $1200 \text{ keV}$
Total radiation power loss (at 500 mA): $600 \text{ kW}$
One of the 4 super-periods

Storage Ring Optical functions

24 Straight sections:
- 4 Long: 12 m
- 12 Medium: 7 m
- 8 Short: 3 m

\[ \beta_x (m) \]
\[ \beta_z (m) \]
\[ 10^* \eta_x (m) \]
### Sizes and divergences at Source points

**Horizontal emittance 3.7 nm.rad**

<table>
<thead>
<tr>
<th></th>
<th>BetaX m</th>
<th>EtaX m</th>
<th>SigmaX μm</th>
<th>Sigma XP μrad</th>
<th>Effective Emittance H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short straight</td>
<td>17,8</td>
<td>0,285</td>
<td>388</td>
<td>14,5</td>
<td>5,61 nm.rad</td>
</tr>
<tr>
<td>Medium straight</td>
<td>4,0</td>
<td>0,133</td>
<td>182</td>
<td>30,5</td>
<td>5,56 nm.rad</td>
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<tr>
<td>Long straight</td>
<td>10,1</td>
<td>0,200</td>
<td>281</td>
<td>19,2</td>
<td>5,40 nm.rad</td>
</tr>
<tr>
<td>Dipole 4°</td>
<td>0,38</td>
<td>0,021</td>
<td>43</td>
<td>107,0</td>
<td></td>
</tr>
</tbody>
</table>

**Vertical emittance 37 pm.rad (1% coupling)**

<table>
<thead>
<tr>
<th></th>
<th>BetaZ m</th>
<th>SigmaZ μm</th>
<th>SigmaZP μrad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short straight</td>
<td>1,75</td>
<td>8,1</td>
<td>4,6</td>
</tr>
<tr>
<td>Medium straight</td>
<td>1,77</td>
<td>8,1</td>
<td>4,6</td>
</tr>
<tr>
<td>Long straight</td>
<td>8,01</td>
<td>17,3</td>
<td>2,2</td>
</tr>
<tr>
<td>Dipole 4°</td>
<td>16,01</td>
<td>24,5</td>
<td>2,1</td>
</tr>
</tbody>
</table>
Search for the best stability

The requirement due to the vertical beam size is $\sigma/10 \sim 1\mu m$

⇒ Site and building aspects

⇒ Storage Ring Girder design

⇒ Keep constant the heat load on optical components:
  => Topping-up
    ➢ Linac
    ➢ Booster
    ➢ Storage Ring Injection equipments
Building design

Building were designed for optimum position stability:

All potential sources of vibrations in a separate technical building:
All pumps for different cooling circuits + supported on damping material
Compressor for the cryogenic source

Synchrotron building:
Storage Ring and Experimental Hall isolated from the other parts of the building

Exp. Hall: => Air temperature regulated at 21 °C ±1.0 °C
Storage Ring Tunnel: => Air temperature regulated at 21 °C ±0.1 °C
=> Water cooling circuit regulated at 21 °C ±0.1 °C

External perturbations
The surface of the 2 adjacent roads will be smoothen during this summer
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Heavy concrete

Overhead crane 7 t

SR tunnel slab thickness 0.95 m

Exp. Hall slab thickness 0.75 m

Offices

Prep Lab.

140 Piles Φ 80

416 Piles Φ 60

Slab settlement < 50 μm/year

Vibrations amplitude < ± 0.5 μm
Vibrations measurements:
Effect of the crane on the storage ring slab

- Peak to peak amplitude: 0.162 µm
- Specified Criteria: 1.0 µm
Storage Ring:

- Specific design of the girders supporting the magnets (1st eigen mode > 40 Hz)
- High resolution Beam Position Monitors (< 1 µm)
- Fast position feedback (1-100 Hz) implemented in 2007
- Minimize effects of ID gap changes (magnetic measurements)
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32 bending magnets
Sitting on 2 girders

280 focusing magnets:
- 160 Quadrupôles
- 120 Sextupôles

Girder design:
First resonant frequency > 40 hz
Strongly clamped on the slab
Vibration measurements on SR girders

Measurements done by AVLS company

3 Girders: C13-1 to C13-3
Vibration measurements on SR girders

Experimental Modal Analysis

1\textsuperscript{st} mode on quadrupole girder (transversal flexion) at 45 Hz!

2\textsuperscript{nd} mode on quadrupole girder (vertical flexion) at 56 Hz
Vibration measurements on SR girders

Residual levels with all utilities ON (cooling, ventilation,..)

Displacement Spectral Density in µm/√Hz

- **Horizontal**
  - Frequency [Hz]
- **Vertical**
  - Frequency [Hz]
Residual levels

Time Signals are very similar since there is no dynamic amplification in the 0-20 Hz range.

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OVERVIEW OF THE STATUS OF THE SOLEIL PROJECT

Linac and Booster designed for topping-up operation

**LINAC**
- 100 MeV
- 3 Hz rep Rate
- Output charge:
  - 8 nC in 300 ns in multibunch mode
  - (500 mA in SR)

**2.75 GeV BOOSTER**
- 2 super periods
- Circumference: 157 m
- 36 Dipoles:
  - 0.67 T / 2.17 m
- 44 Qpoles:
  - 10.3 T/m - 0.4 m
- Emittance:
  - 110-150 nm.rad
- Power supplies cycling at 3 Hz
- 1.5 nC in 3 pulses (2ns)
  - in 8 bunch mode
  - (90 mA in SR)
Storage Ring Injection Kickers

Choice of solid-state switches for all the pulsed power supplies

3 HV modules in // based on fast IGBT => matched kickers, able to permit a very steady operation for Top-Up injection.
The PS’s create 8 kV-5.6 kA pulses, width 6.5 µs half sine, low jitter < 0.5 ns.

K2&K4 field integral identity < 3.5 \times 10^{-3}

THPLS100
P. Lebasque
Eddy current septum magnet leakage field strongly reduced
=> Full sine excitation (150 µs)
=> Optimised shielding screen
\[ I_{\text{leak}} < 4 \mu T.m \Rightarrow 10 \text{ ppm of main field integral (255 mT.m)} \]
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6 NEG coated Aluminium quadrupole type vacuum vessels with SS/Al flanges (SDMS/SAES)

2 stainless steel dipole type vacuum vessels (SDMS)

5 stainless steel BPM-Bellows modules with RF shield (COMVAT/RIAL)

1G coated Aluminium drupole type vacuum vessels with SS/Al flanges (SDMS/SAES)

Vacuum system for one typical cell
**Storage Ring Vacuum system**

Vacuum system for one typical cell

Together with the Straight Sections chambers, 
~200 m of NEG coated Al chamber (56% of the ring)

SOLEIL = first SR Machine with extensive use of NEG coated AL vessels
In-situ Bake-out of vacuum vessels

Goals:
- Outgassing all vacuum parts
- Activation of NEG coating deposited on the quadrupole chambers

Method:
- Heating of the vacuum chambers up to 180°C
- Use of resistive heaters deposited on 1mm thick Kapton foil, glued onto the vessels
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Storage Ring Vacuum system

SS vacuum vessels
NEG coated vacuum vessels

Bake-out procedure (C. Herbeaux)

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After bake-out, the total pressure measured in a cell is in the low $10^{-10}$ mbar range. Max pressure ~ 4 $10^{-10}$ mbar is measured close to the crotch absorber
10 small aperture Insertion device chambers (L=5.5 m / h=10 mm) installed before injecting the first electrons! (First facility to dare doing it!)
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Storage Ring: magnets

Dipoles (38) : TESLA
Quadrupoles (160) : DANFYSIK
Sextupoles (120) : SIGMAPHI
alignment of the Magnetic measurement bench

May 2004-Aug. 2005
Magnetic measurements of 326 electro-magnets: magnetic axis centering, field properties

rotating coil bench built to reach magnetic centering to ±25 μm and tilt ±0.1 mrad

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Statistical analysis of measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quadrupoles</td>
</tr>
<tr>
<td></td>
<td>Mean Value</td>
</tr>
<tr>
<td>ΔX (microns)</td>
<td>1.5</td>
</tr>
<tr>
<td>ΔZ (microns)</td>
<td>2.6</td>
</tr>
<tr>
<td>Tilt (mrad)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

THPLS007
P. Brunelle
ANS Qpoles (magnetic centres) Altimetry Mar 06 with N3 optical level

rms: appr. 0.087mm

Before alignment Mar06  After alignment Apr06  Smoothing May06

Storage Ring : Magnet alignment

THPLS006
JC Besson
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Design and construction of a dedicated cryomodule with 2 SC cavities so as to provide HOM free operation up to 500 mA. (Collab CEA/CERN/SOLEIL/ESRF)

- Prototype tested initially at CERN and ESRF (2000-2002)
- Completely refurbished
- Tested at CERN (Oct 05).
- Installed On the Ring (Nov 05).
- Cooled @ 4 K since May 10, 2006
- RF conditioned since May 24, 2006 (150 kW/coupler)
1st cryomodule inside SR tunnel

1st cryomodule will enable alone operation up to 300 mA. A 2nd cryomodule is being built by ACCEL for operation at 500 mA (2nd half of 2007)
Motivation: No klystrons suitable to the power required at SOLEIL

- Solid state amplifier: 1st unit (40 kW) built for the Booster (2004)

→ Decision to use this technology for the Storage Ring
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Storage Ring RF amplifier
4 x 190 kW power amplifiers

4 x 47kW solid state amplifiers
724 modules

315 W @ 352 MHz
Gain > 13 dB
Efficiency ~60%

4 x 190 kW power amplifiers

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Storage Ring RF plant
4 x 190 kW power amplifiers

190 kW @ 352 MHz
Gain = 52 dB
Overall Efficiency (PS,..) ~50%

Full Cost (with PS and WG distribution)
Booster : 200 k€ for 40 kW => 5 € / W
Stor. Ring : 3 M€ for 750 kW => 4 € / W
Modularity = You just pay for the W you actually need
April 6th, 2006: 180 kW from amplifier n°1

World record!

Highest RF power produced with transistors

April 7th, 2006: 180 kW from amplifier n°2
Cryogenic source (Air Liquide) in RF area
400 W @ 4K + 50 l/h liquid He production

2000 litre Dewar

Cryo valve box

Cold box
120 BPMs (LIBERA modules from I-Tec) featuring:
- sub micron resolution
- turn by turn capability (worked nicely during commissioning)

2 DCCTs, 1 FCT (Bergoz)

1 visible light monitor, 1 pinhole camera, 1 streak camera

Tune monitors and striplines

H and V scrapers

Fast and slow beamloss monitors
SOLEIL first facility using TANGO at full scale

Collaboration ESRF/ELETTRA/SOLEIL/ALBA

- easy and efficient tools to control any equipment
- data archiving
- control of all equipments from the control room
- supervision done using “Global Screen” applications (developed by operators)
- All hardware installed (Crate with CPCI and boards, PLC’s..)
- Machine commissioning : Matlab applications (Matlab Middle Layer Toolkit...)

THPCH109
A. Nadolski
Electromagnet Helical Undulator HU640

<table>
<thead>
<tr>
<th></th>
<th>DanFysik</th>
<th>HU640</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td></td>
<td>640 mm</td>
</tr>
<tr>
<td>Nbr of Periods</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Length</td>
<td></td>
<td>10.0 m</td>
</tr>
<tr>
<td>Type</td>
<td>Electro-magnetic</td>
<td></td>
</tr>
<tr>
<td>Min. gap (mm)</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Polarisation</td>
<td>Circ./Lin. adjustable</td>
<td></td>
</tr>
<tr>
<td>Bxmax</td>
<td>0.09 T</td>
<td></td>
</tr>
<tr>
<td>Bzmax</td>
<td>0.11 T</td>
<td></td>
</tr>
<tr>
<td>Photon Energy</td>
<td>5 – 40 eV</td>
<td></td>
</tr>
</tbody>
</table>

THPLS118
F. Briquez
Vacuum chamber for HU640

- Al extruded up to 10 m long
- Water cooled
- NEG coated in 2 parts 5m long (SAES)
- Welded together (CINEL)
### Electromagnet Helical Undulator HU256

<table>
<thead>
<tr>
<th>BINP/SOLEIL</th>
<th>3 x HU256</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>256 mm</td>
</tr>
<tr>
<td>Nbr of Periods</td>
<td>12</td>
</tr>
<tr>
<td>Length</td>
<td>3.6 m</td>
</tr>
<tr>
<td>Type</td>
<td>Electromagnetic</td>
</tr>
<tr>
<td>Minimum gap</td>
<td>15 (V) 50 (H)</td>
</tr>
<tr>
<td>(mm)</td>
<td></td>
</tr>
<tr>
<td>Polarisation</td>
<td>Circ./Lin. H et V</td>
</tr>
<tr>
<td>Bxmax</td>
<td>0.275 T</td>
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<tr>
<td>Bzmax</td>
<td>0.400 T</td>
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<tr>
<td>Photon Energy</td>
<td>10 – 1000 eV</td>
</tr>
</tbody>
</table>

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F. Briquez

14B

THPLS118

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### Apple-II Type Helical Undulator HU80

<table>
<thead>
<tr>
<th>ELETTRA/SOLEIL</th>
<th>3 x HU80</th>
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<tbody>
<tr>
<td>Period</td>
<td>80 mm</td>
</tr>
<tr>
<td>Number of Periods</td>
<td>19</td>
</tr>
<tr>
<td>Length</td>
<td>1.65 m</td>
</tr>
<tr>
<td>Type</td>
<td>Apple-II</td>
</tr>
<tr>
<td>Minimum gap (mm)</td>
<td>15 to 250</td>
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<tr>
<td>Polarisation</td>
<td>Circ./Lin.</td>
</tr>
<tr>
<td>Bxmax</td>
<td>0.76 T</td>
</tr>
<tr>
<td>Bzmax</td>
<td>0.85 [1.0] T</td>
</tr>
<tr>
<td>Photon Energy</td>
<td>80 [35] – 1500 eV</td>
</tr>
</tbody>
</table>
In-Vacuum undulator U20 inside SR tunnel

<table>
<thead>
<tr>
<th>DANFYSIK/SOLEIL</th>
<th>3 x U20</th>
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<tr>
<td>Period</td>
<td>20 mm</td>
</tr>
<tr>
<td>Nbr of Periods</td>
<td>98</td>
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<tr>
<td>Length</td>
<td>2.0 m</td>
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<tr>
<td>Type</td>
<td>Hybrid In-Vacuum</td>
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<td>Min. gap (mm)</td>
<td>5.5 to 30</td>
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<tr>
<td>Polarisation</td>
<td>Linear H</td>
</tr>
<tr>
<td>Bzmax</td>
<td>0.97 T</td>
</tr>
<tr>
<td>Photon Energy</td>
<td>3 – 18 keV</td>
</tr>
</tbody>
</table>
Commissioning

Linac

Booster

Storage Ring
Linac installation completed by THALES in Spring 2005

Integrates 2 Accelerating sections donated by CERN
1\textsuperscript{st} beam on July 2\textsuperscript{nd}, 2005

Many experiments and tuning performed by THALES and SOLEIL.

Excellent performances (stability/reproducibility)

Final Acceptance pronounced on November 15\textsuperscript{th}, 2005
Beam transmission

Gun

Buncher input: 85%

Section 1 output: 62%

After Energy analyzing slit: 53%

TUPCH112
A. Setty
LINAC: Short Pulse Mode

4 pulses with a level's decrease: < 5 %

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LINAC

Characterization using TL1 diagnostics:

=> Emittance measurements

=> Energy dispersion

Emittance measurements results

<table>
<thead>
<tr>
<th>Mode</th>
<th>Beam Charge</th>
<th>Horizontal $\pi$ mm mrad</th>
<th>Vertical $\pi$ mm mrad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Pulse</td>
<td>10.6 nC</td>
<td>47</td>
<td>52</td>
</tr>
<tr>
<td>Short Pulse (1)</td>
<td>0.55 nC</td>
<td>64</td>
<td>67</td>
</tr>
<tr>
<td>Short Pulse (4)</td>
<td>2.27 nC</td>
<td>67</td>
<td>78</td>
</tr>
</tbody>
</table>

(Specifications: $(\gamma \epsilon$ at 90%) $< 200 \pi$.mm.mrad)

THPLS010
MA Tordeux

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Booster

Installation was completed in July 2005
1st beam in the Booster at 110 MeV

July 23rd 2005

Booster equipment are OK!

Beam stored!
Booster: 1st beam accelerated to 2.75 GeV

Injection at 110 MeV

Loss on resonances

October 13th 2005
Efficiency 2.5%
(from TL1)
Fast increase of the acceleration efficiency

Oct 13
TL1 3 nC pulse

Oct 18
TL1 9 nC pulse

Oct 19
2.75 GeV

Oct 20
75%
Booster: Power supplies tracking

4 power supplies (Bruker) ramped at 3 Hz: “Tracking” ± 0.2%

Dipole 1 versus Dipole 2
(2 x 560 A / 1000 V)

QF, QD versus Dipole 1

WEPLS118
P. Gros
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**Booster Efficiency ~ 90-95 %**

- Tunes kept within ± 0.05
- Beam decelerated down to 140 MeV

**THPLS008 A. Loulergue**
Booster: 1\textsuperscript{st} extraction of 2.75 GeV beam

May 6\textsuperscript{th}

Booster FCT

Transfer line FCT1

Transfer line FCT2
May 14, 2 am: THE VERY FIRST TURNS (9) (without any trajectory correction)

The beam went through the 10 small aperture chambers!!

Start of radiation measurements (May 14, May 20, May 31)
Storage Ring Commissioning

1st beam storage (0.3 mA) on June 2nd at 2 am!
Storage Ring Commissioning

1st beam accumulation (8 mA) on June 4th at 3 am!

<table>
<thead>
<tr>
<th>ID</th>
<th>Bendings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1  2  3</td>
</tr>
<tr>
<td>4</td>
<td>5  6  7</td>
</tr>
<tr>
<td>8</td>
<td>9  10 11</td>
</tr>
<tr>
<td>12</td>
<td>13 14 15</td>
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<td>16</td>
<td>17 18 19</td>
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<td>20</td>
<td>21 22 23</td>
</tr>
<tr>
<td>24</td>
<td>25 26 27</td>
</tr>
<tr>
<td>28</td>
<td>29 30 31</td>
</tr>
</tbody>
</table>

8.35 mA

Filling Mode not valid
Current Total 0.0 A.h
Lifetime not valid

Orbit (RMS)
H 0.00 μm
V 0.00 μm

Orbit (Peak)
H 0.00 μm
V 0.00 μm

Emittance
H 0.00 nm
V 0.00 nm

Tunes
H 0.00
V 0.00

Average Pressure
8.21e-10 mbar

Commissioning ANS: vers le stockage
Within 2.5 weeks:
From the 1st stored beam to 85 mA!
Integrated current = 2.6 A.h
Continuous Injection during radiation controls
A set of radiation monitors are distributed around the tunnels (34 $\gamma$ and 28 n).

Radiation monitoring

The maximum dose over 4 hours should not exceed 2 $\mu$Sv

$\Rightarrow$ Strong constraints during commissioning time

$\Rightarrow$ We managed to achieve it, thanks to the **very flexible synchronization system**:

$\Rightarrow$ Linac pulse at any frequency from 3 shots/s down to one shot on demand

$\Rightarrow$ Very low activation level inside the tunnels
Results from the $\gamma$ monitors interlocking the Linac.
Uncorrected closed orbit errors: $\text{rmsH} = 2.31$ mm, $\text{rmsV} = 0.58$ mm
After correction: \( \text{rmsH} = 0.38 \text{ mm}, \text{rmsV} = 0.31 \text{ mm} \)

Local bump to avoid obstacle

Faulty BPM
Vacuum conditioning

Average pressure of Cell C07 normalised to current vs the beam dose

$$y = 3 \times 10^{-10} \times 0.5386$$

C. Herbeaux
Average pressure of Cell C07 normalised to current vs the beam dose

\[ y = 4 \times 10^{-10}x^{-0.6353} \]

\[ y = 2 \times 10^{-10}x^{-0.3911} \]

NEG coated vacuum vessels

Non NEG coated stainless steel vacuum vessels

C. Herbeaux
Few problems

- Problem of reduced flow due to small resin balls contaminating the water cooling circuit due to a human mistake
  - Blocking of the filters on the magnets
  - Blocking of the filters on some power supplies
  - Blocking of the crotch cooling circuits
  - Cleaning of the whole network during this summer

- Problem of obstacle reducing the beam stay clear aperture
  - Bad mounting of 2 RF Finger assemblies (out of ~200)
  - Will all be checked during this summer
Smooth and efficient start-up of the commissioning

- All diagnostics required were available on time
- The TANGO Machine control system worked nicely

- Excellent machine alignment

- Vacuum conditioning in good progress
- But present current limitations possibly due to Fast Ion instabilities?

- Present performances are very promising

Our present goal is to reach 100 mA usable by the beamlines

The delivery of photon beam for the commissioning of the beamlines will start in September 2006
The construction SOLEIL is completed.

SOLEIL has largely benefited from the Experience and expertise of the other labs.

We believe that SOLEIL has in return brought some significant contributions to the accelerator technologies.