SOLEIL II : Planning and opportunies

Sommaire

1. SOLEIL : General introduction

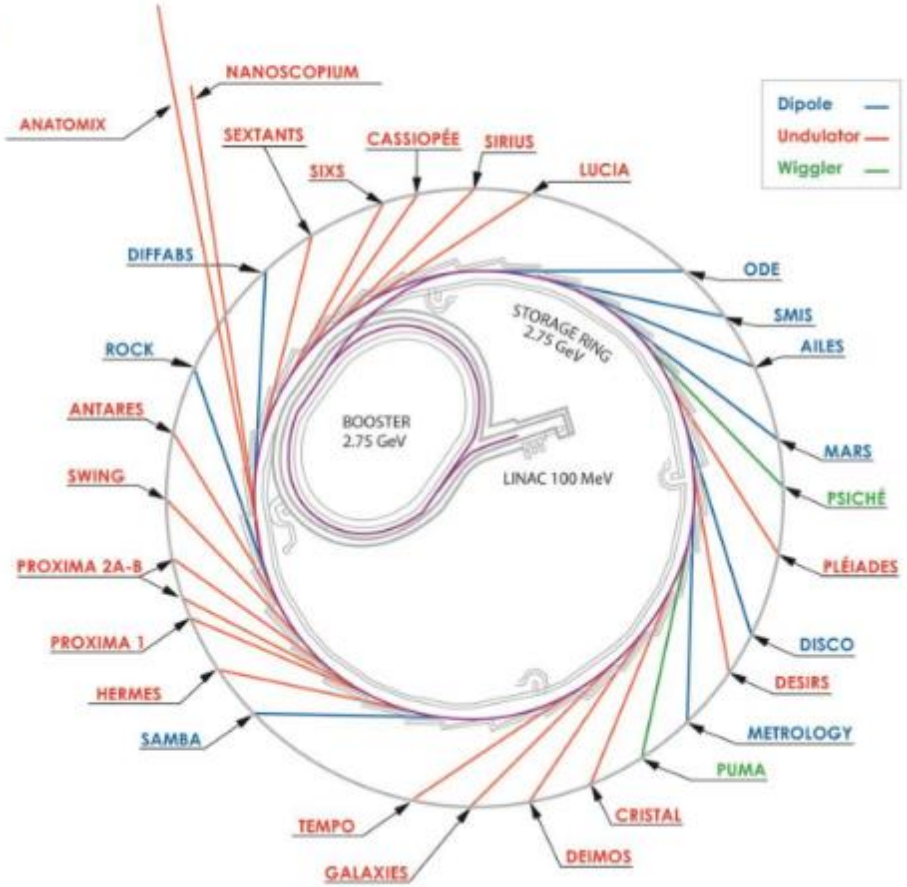
2. Upgrade project :
   1. Scope of the project
   2. Accelerators upgrade
   3. Beamlines Upgrade

3. SOLEIL purchasing procedures

72%

28%

- Storage ring 354m, 2.75GeV
- 29 beamlines
- Open to external users in 2008
- Overall construction budget (full cost) ~600 M€
- Annual budget ~63 M€
- ~ 450 staff members



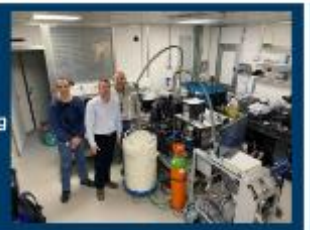
SOLEIL missions and objectives

1. Performance of accelerators and beamlines

Beam availability **98,41%**

Mean time between failures (MTBF) **109 hours**

2. Research programs using synchrotron radiation



174 Scientific collaboration agreements

>50 projects With the **A**gence **N**ationale de la **R**echerche (ANR)

3. High quality service to users

~ 700 projects per year

8000 single users From **4000** laboratories during the last 5 years **99 %** satisfied or very satisfied

~ 700 papers per year

150 with impact factor (**IF**) > 9

~100 with results from several beamlines

Users
65% from France
26% from EU
9% from the rest of the world

4. Industrial use

~ 10 technology tranfers to SMEs

Partnership with local structures and associations : POLVI, Ile-de-Science, Science Accueil

14 patents

~ 170 Industrial projects per year

5. Engagement towards the society, training and education

SOLEIL partner of 66 universities

30 apprentices

4000 visitors per year

Analyses for more than 20 hospitals, in France and abroad

Contributed to **800** PhD theses

Tools for school teachers

31 training sessions for professors 2018-2019

30 staff teaching

SOLEIL II project : upgrade scope

- Upgrade in 2 phases of 5 years each of accelerators, beamlines and infrastructure, 20 years after the facility was open to users, keeping the competitiveness of SOLEIL and complementarity with the ESRF-EBS.

- Address present and future scientific and societal challenges through a reconstruction of the storage ring with a 50 x 50 pm.rad emittance, 100 times brighter beams, and adapted beamlines. Keep the broad energy range of the present SOLEIL from THz to hard x-rays. In phase 1, prioritization of 6 beamlines to be relocated (1IR, 1UV, 2 soft x-ray BLs, 1 tender xray BL) + “flagship” BIs (depending of available funding).

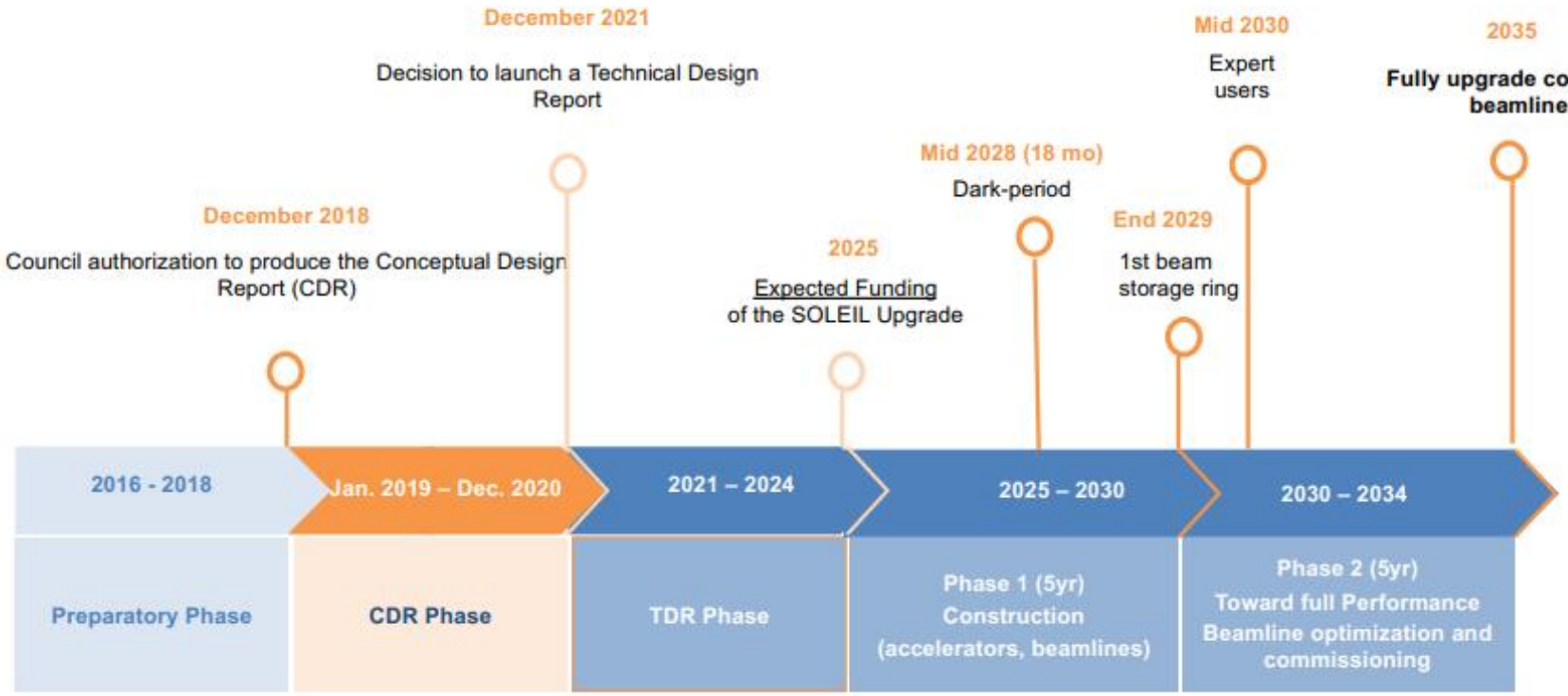
- Upgrade of IT infrastructure and continuation of SOLEIL’s digital transition.

- Keep present infrastructure when possible in order to optimize project’s cost and upgrade of ageing infrastructure to reduce its environmental footprint.

- Reduce carbon footprint (50 % decrease of storage ring electric power consumption).

- Develop innovative instrumentation and contribute to the development of industries.

Timeline

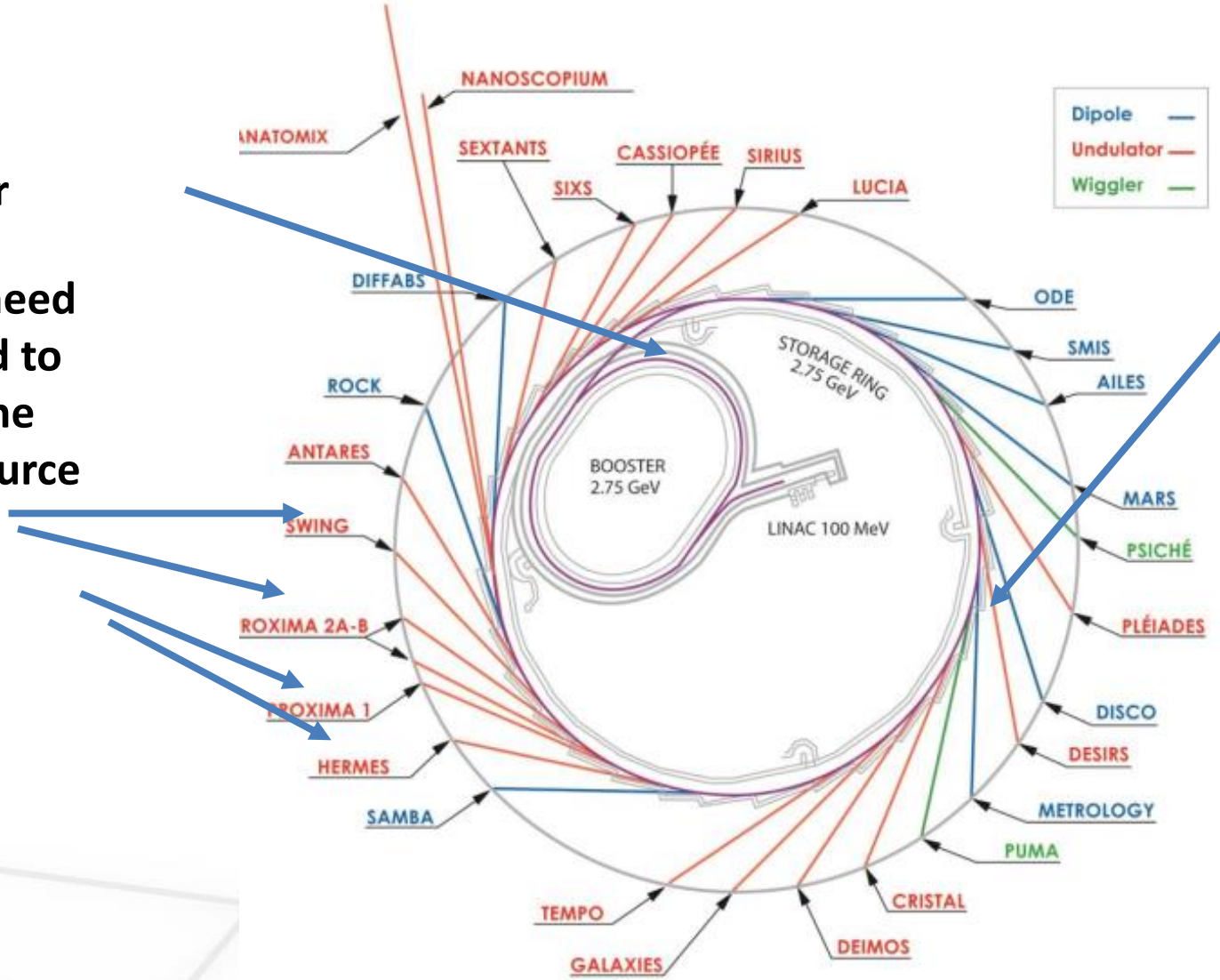


- Presently in the TDR phase
- Strong prototyping and preparation actions with support of CNRS, CEA and Ministry
- Waiting for official decision to built the upgrade and for the amount of the funding by the end of the year

SOLEIL II : Upgrade project scope

New booster

All beamlines need to be optimized to take profit of the new photon source



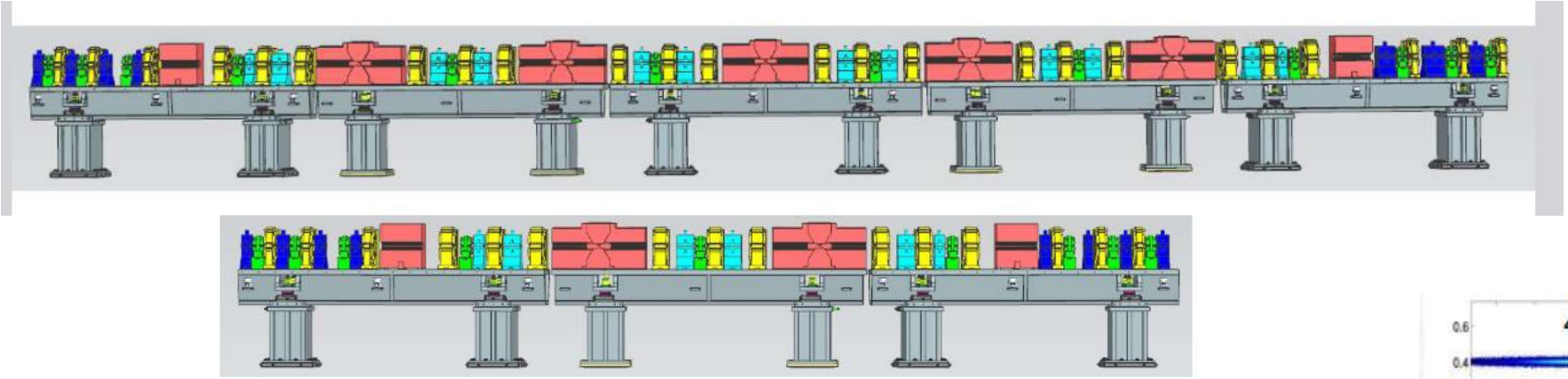
New storage ring

Upgrade of IT infrastructures

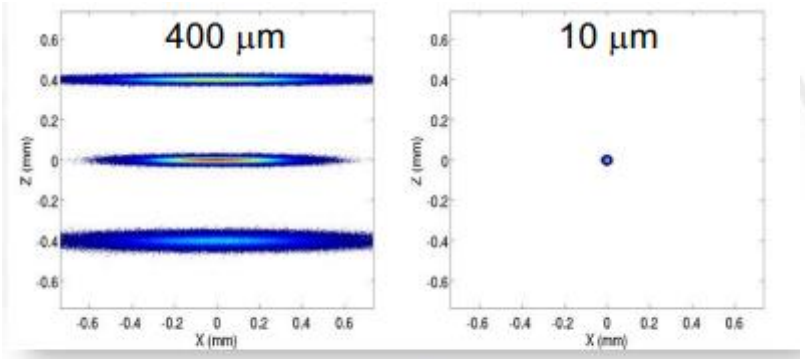
Upgrade of the Bulidings :

- **HVAC,**
- **Electrical power distribution**
- **Fluid networks**

Upgrade of the Storage Ring



Electron beam size
@source point



SOLEIL → **SOLEIL II**

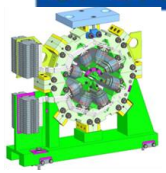
3rd generation — 4th generation

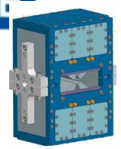
A complete new storage ring with new components except the insertion devices (phase 1) and parts of the front ends which will be reused at the restart.

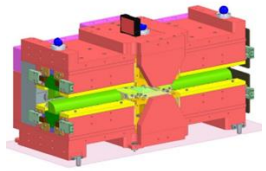
Lattice with high compactness
Multipole magnets with high magnetic gradient to reach performances
Very tight mechanical tolerances for all the equipment
Technologies at the higher level of know how

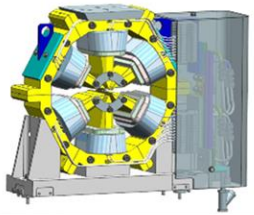
In house R&D, partnership with industry, prototyping,

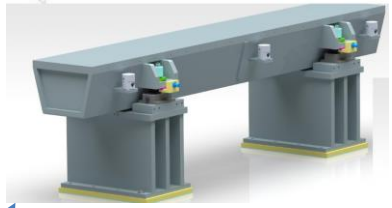
Components for the storage ring

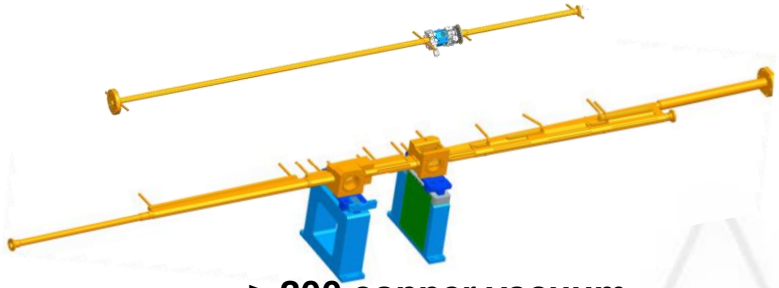

Octupole (216)

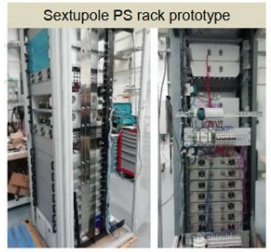

Quadrupole (144 + 196 RB)


Dipole (116)

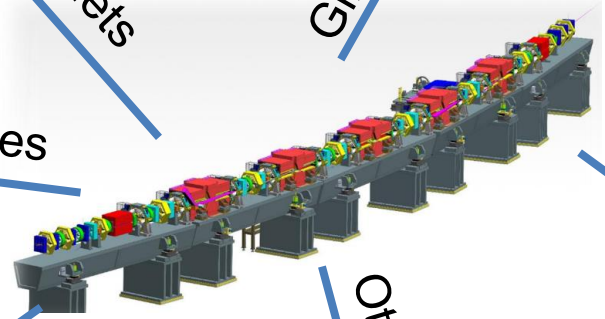

Sextupole (408)


86 girders


> 200 copper vacuum chambers with NEG coating



> 1500 individual PS for electromagnets



Magnets

Girders

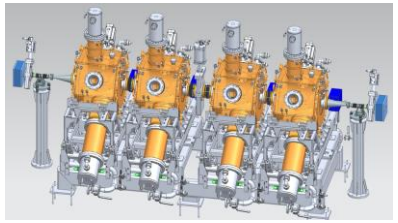
Vacuum

Power supplies

Insertion devices

Radiofrequency

Others

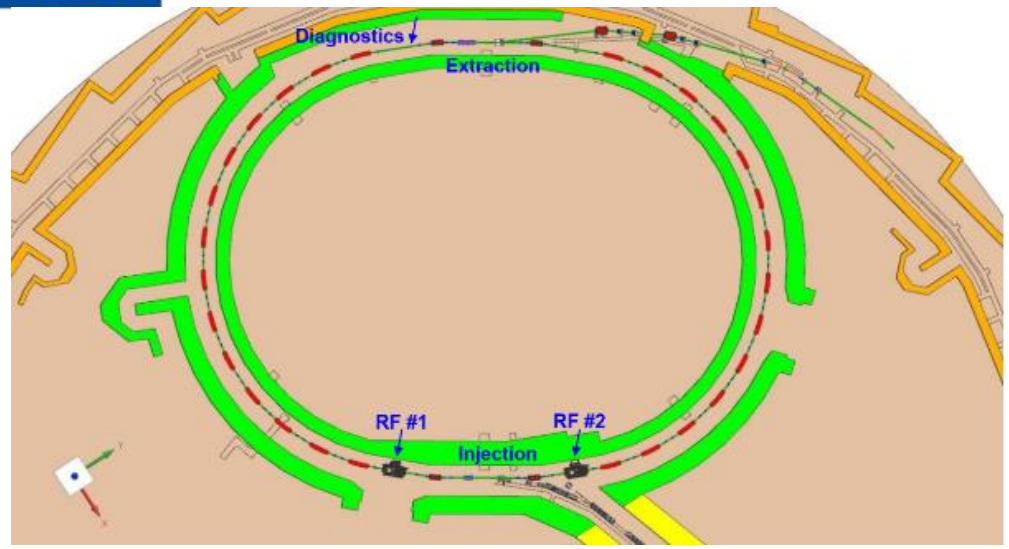

Cavity EBS-type 352 MHz HOM-damped

Cmd/Ctrl
Beam Diagnostics
Injection pulsed magnets
Radiation safety
….


2 for phase 1
About 15 for phase 2

Launch of the first calls for tender on beginning of 2025

Booster Upgrade



In order to reach the performances of the storage ring, the injector must be replaced

- A new 145 m circumference booster will be rebuilt and reinstalled

- New magnets : about 210 electromagnetic magnets
- New power supplies for the magnets
- New vacuum system (stainless steel)
- New girders
- New pulsed magnets for the booster to SR extraction

→ Level of performances as high as the present SOLEIL I storage ring

In house specifications and design.
Possibly : Fabrication, integration and installation could be fully sub-contracted

BEAMLINE AND LABS PROGRAMME UPGRADRE

29 Beamlines + 3 Laboratories

2025

Stage 1
Construction

Goals:

Maximise number of beamlines at restart

Demonstrate source performances

2029

Cat I: Reconstruction + Modernisation →
- 7 beamlines to be moved

Cat II: Adaptation + Upgrade * →
- 14 Insertion Devices
- 8 Bending Magnets
- 3 Laboratories

2030

Stage 2

Towards full performance

Evolution + Optimisation →
- Upgrade of remaining beamlines

2034

Enabling Technologies R&D
Optics, Detectors, Mechatronics

Upgrade des lignes de lumière

- All beamlines will be gradually upgraded:

- Certain beamlines will be reconstructed during the beam shutdown period in 2028-2029 (phase 1) and prepared to allow the new performances of the source to be exploited.Other beamlines will be gradually upgraded after 2030 (Phase 2) depending of the budget we will get.

- The upgrade of the lines requires the realization :
  - new optics (mirrors, monochromators, etc.). Several tens of high quality mirrors to be changes
  - New instrumentation (detectors, sample environments, sample holders (with nanopositioning, cryogenic, microfluidic, etc.,,

→ Evaluation of needs in progress

SOLEIL purchasing procedures

- **SOLEIL vs Public Procurement Rules (Code de la Commande Publique « CCP »)**

- **Innovation and SOLEIL purchasing procedure**

For futher informations

Contact for SOLEIL : achats@synchrotron-soleil.fr

Part 1 – SOLEIL vs Public Procurement rules

- SOLEIL Budget is allocated by our shareholders CEA/CNRS which are public institutes
- SOLEIL is subject to the public procurement rules « Code de la Commande Publique »
- Use the paperless plateform : PLACE
- Procedures available on our website

Procurment policy at SOLEIL

THRESHOLD	PROCEDURES
0 € H.T. < M <= 10 000 € H.T.	1 offer is needed
10 000 € H.T. < M <= 20 000 € H.T.	3 offers are needed
20 000 € H.T. < M <= 40 000 € H.T.	Publicity on the "PLACE" platform for offers*
40 000 € H.T. < M <= 215 000 € H.T.	Public procurement rules are applied

Innovation and SOLEIL purchasing procedure

- Innovative procurement (adapted procedure threshold < à 100 000 € Excluding Tax)
  - Sustained experimental system (decree no. 2021-1634 of December 13, 2021) => market without advertising or competitive bidding
  - Develop innovation within the administration,
  - Promote access for VSE-SMEs,
  - Used at SOLEIL for Protyping

- Procedure with negotiation (formalized procedure threshold > 215 000 € Excluding Tax)
  - Negotiate all market conditions with one or more economic operators,
  - When the need cannot be satisfied without adapting immediately available solutions.
  - When the contract includes design services,
  - When the expression of needs cannot be done with sufficient precision by referring to a standard, a European technical assessment, a common technical specification or a technical reference system,
  - When, in the context of a call for tenders, only irregular or unacceptable offers

Innovation and SOLEIL purchasing procedure

Competitive dialogue (formalized procedure threshold > 215,000 € excluding tax)

- When the need cannot be satisfied without adapting immediately available solutions or
- When it consists of an innovative solution

PCP Pre-Commercial Procurement (European procedure)

- Public purchasing before marketing
- Horizon 2020 innovation program
- R&D
- Superflat is a specific task (3.1 - WP3) of the LEAPS-INNOV project

Conclusion

- Very challenging project which require technologies at the higher lever of the state of art in many technical fields
- First calls for tender will be launched at the beginning of 2025
- Needs for beamlines upgrade and IT infrastructures will be better identified by the end of 2024
- For further information on procurement procedure contact our purchase office.

Contact for SOLEIL : achats@synchrotron-soleil.fr

Thank you for your attention