WELCOME TO SOLEIL

Amor Nadji
On behalf of Synchrotron SOLEIL

- **SOLEIL is the French synchrotron light source, both a large scale facility and a research laboratory.**

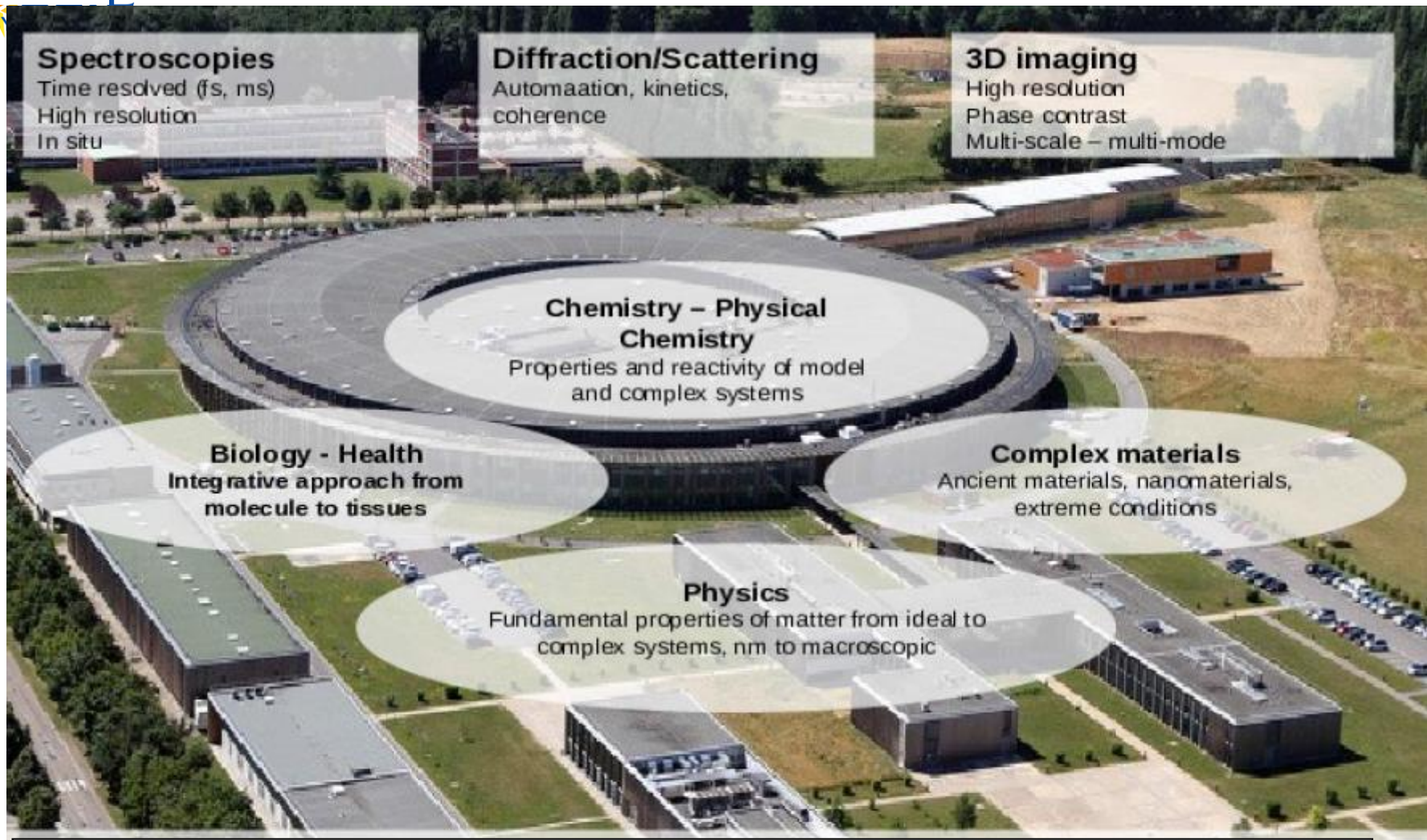
- **Shareholding of the French public centers CNRS and CEA, SOLEIL is at the service of the international scientific community and industry.**

72 % **28 %**

- **350 permanent staff.**

- **Functioning budget per year : ~ 55 M€.**

Scientific Strategy



Plateforms

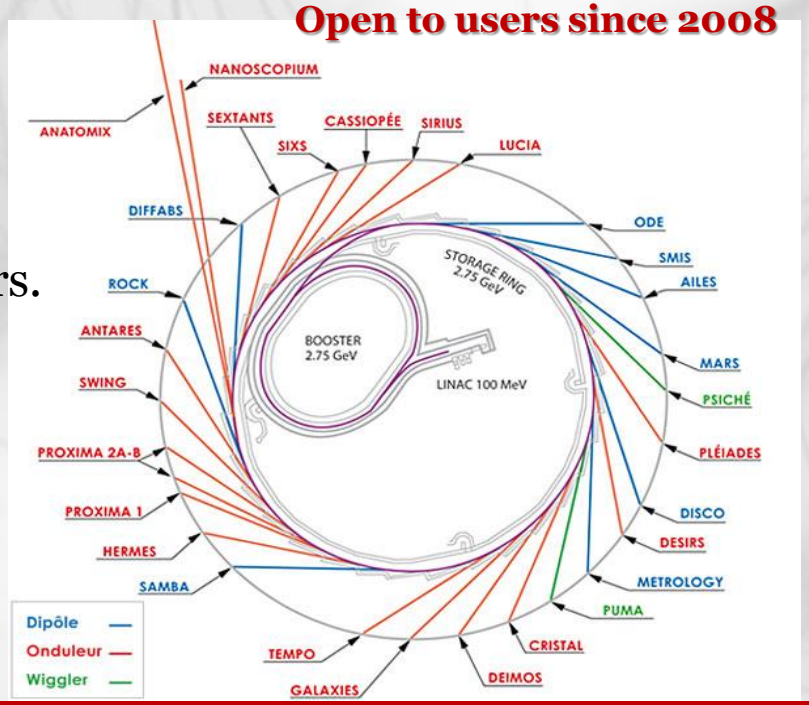
Medium-long term projects, support and complementary instrumentations, interfaces R&D

Ancient materials: IPANEMA | **Environmental sciences** | **Biology-health**

SOLEIL : A 3rd generation Synchrotron Light Source

Open to users since 2008

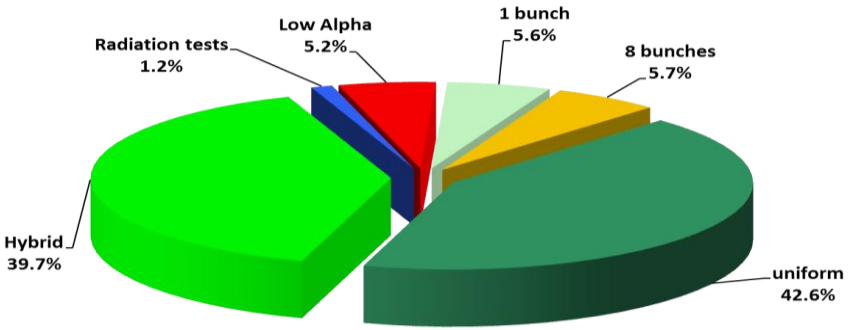
- 29 beamlines operational in 2018.
- > 42000 users visits since 2008.
- > 600 articles published yearly.
- Machine availability > 98% and MTBF > 90 hours.



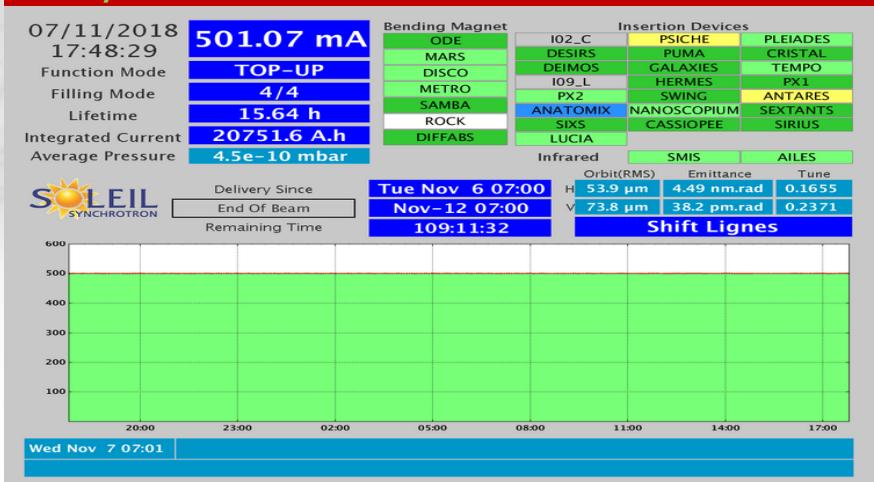
Mode of operation Bunch fill. patterns	User Operation in 2018	Ultimate performance achieved
Multibunch (M2)	500 mA	500 mA
Hybrid/camshaft mode (M)	425 mA + 5 mA	425 mA + 10 mA
8 bunches (8)	100 mA	110 mA
1 bunch (S)	16 mA	20 mA
Low-α: Hybrid mode (L)	4.7 ps RMS for 65 µA	< 3.2 ps RMS for 15 µA

Broadband spectrum:
9 orders of magnitude from far IR to hard X-rays.

- ~ 5000 hours of photon beam for user operation.



Top up injection in all modes



SOLEIL Lattice and Some Parameters

Rather small Circumference: **354 m**

16 cells

High ratio of free straight sections (~45%)

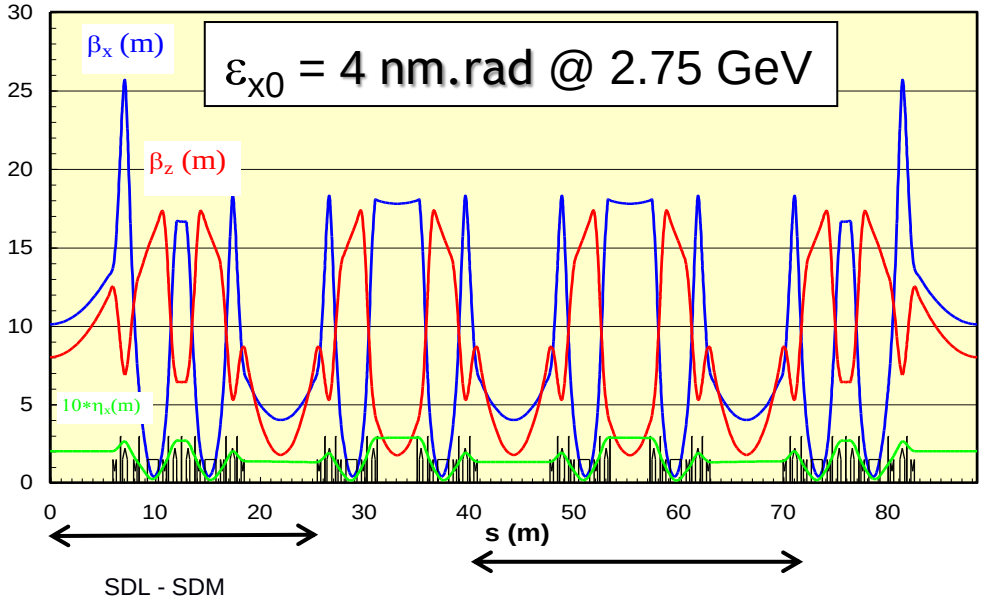
24 straight sections

4 x 12 m

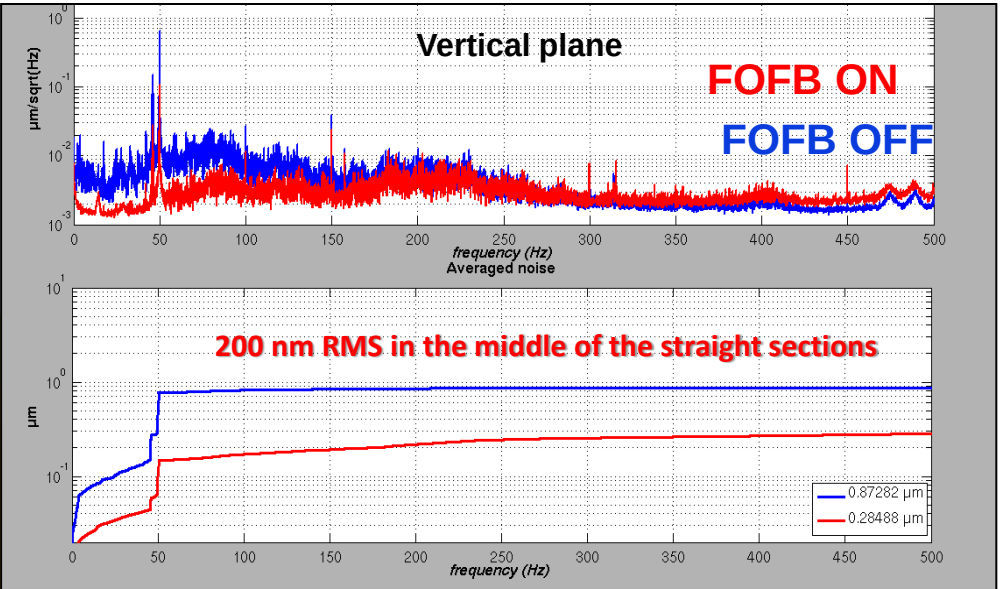
12 x 7 m

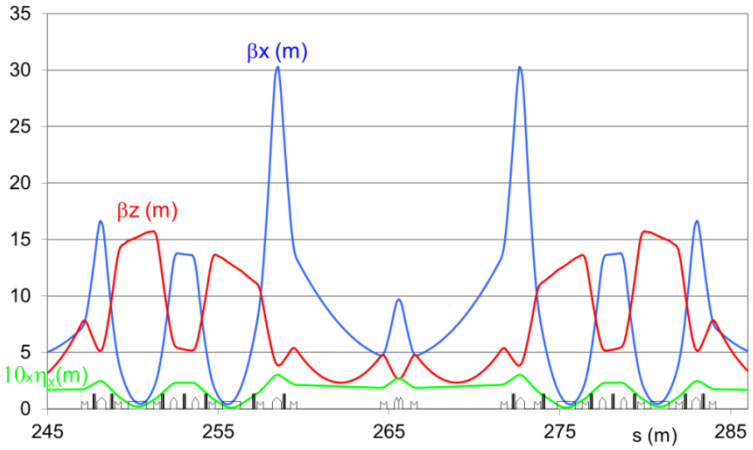
8 x 3.6 m

Very compact magnetic structure



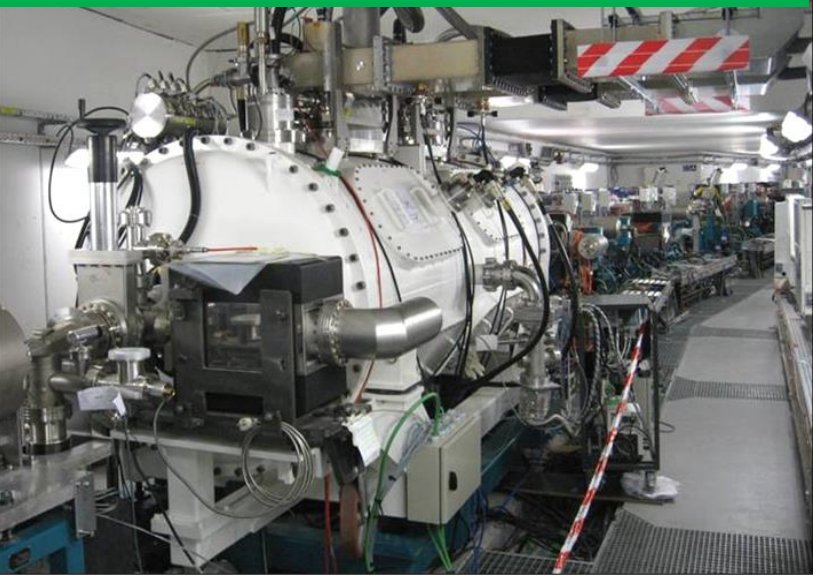
Very stable beam





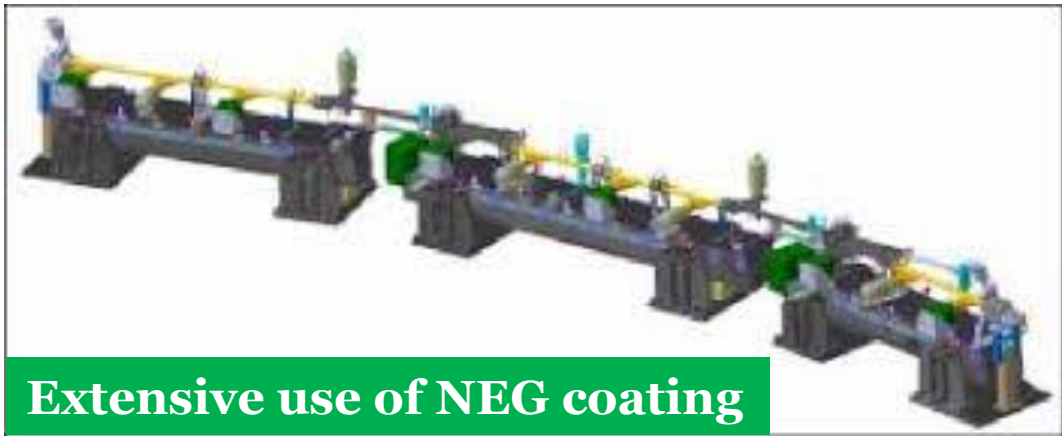
One long straight section (**SDL13**, accommodating 2 long beamlines) **has been modified.**

352 Superconducting RF cavity



RF Solid State Amplifiers

Diverse Insertion Devices



Extensive use of NEG coating

COXINEL

(**CO**herent **X**ray source **IN**ferred from **E**lectrons accelerated by **L**aser)

ERC Grant (M.E. Couprie)

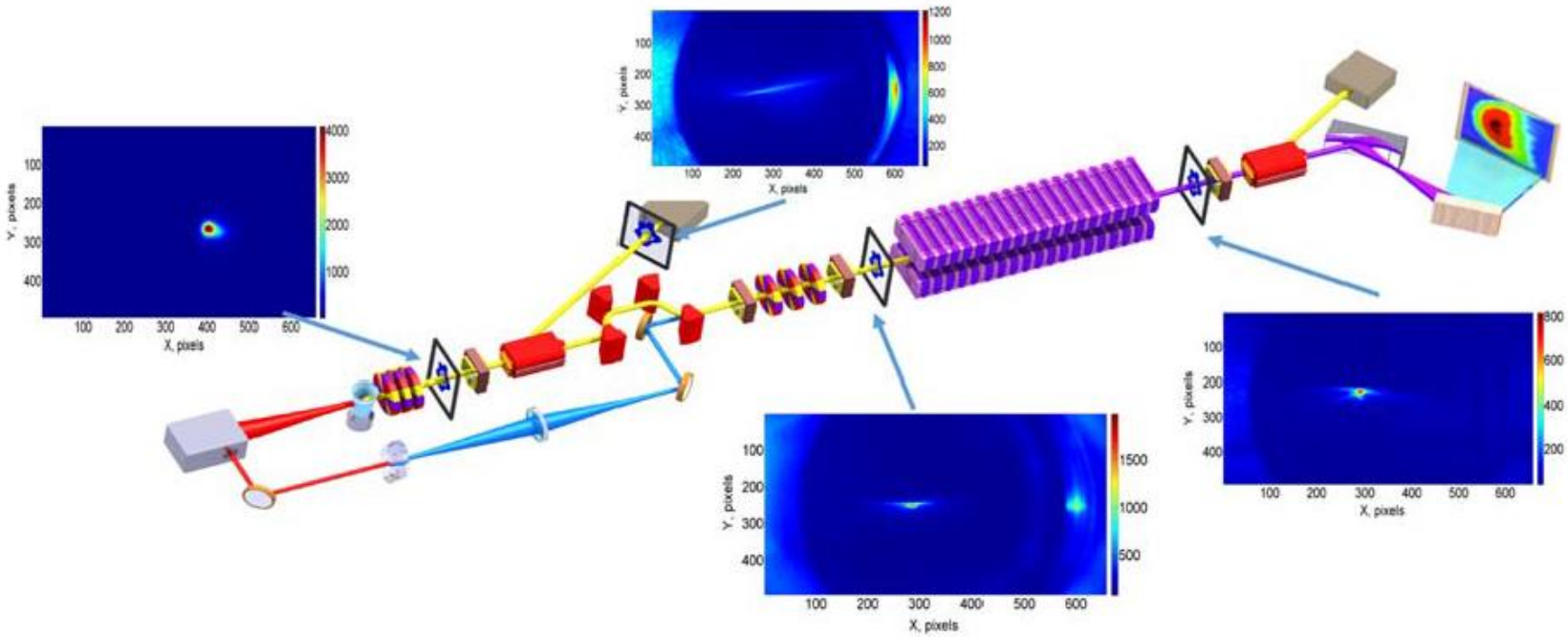
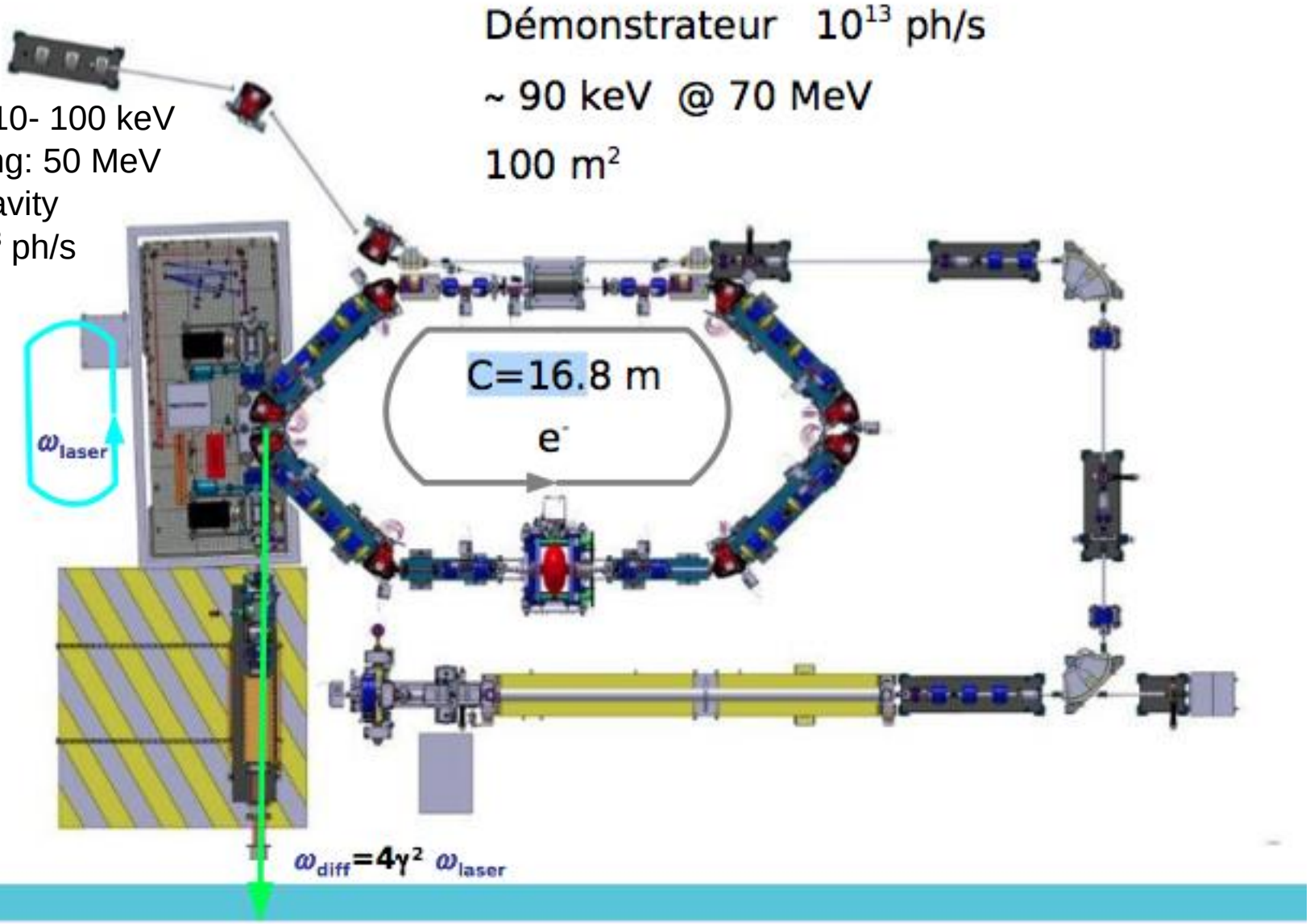


Figure 1: First transport of the LPA electron beam in the COXINEL beamline.

Aims at demonstrating Free Electron Laser amplification with present LWFA performances Using an existing TW laser.

ThomX: X-ray compact

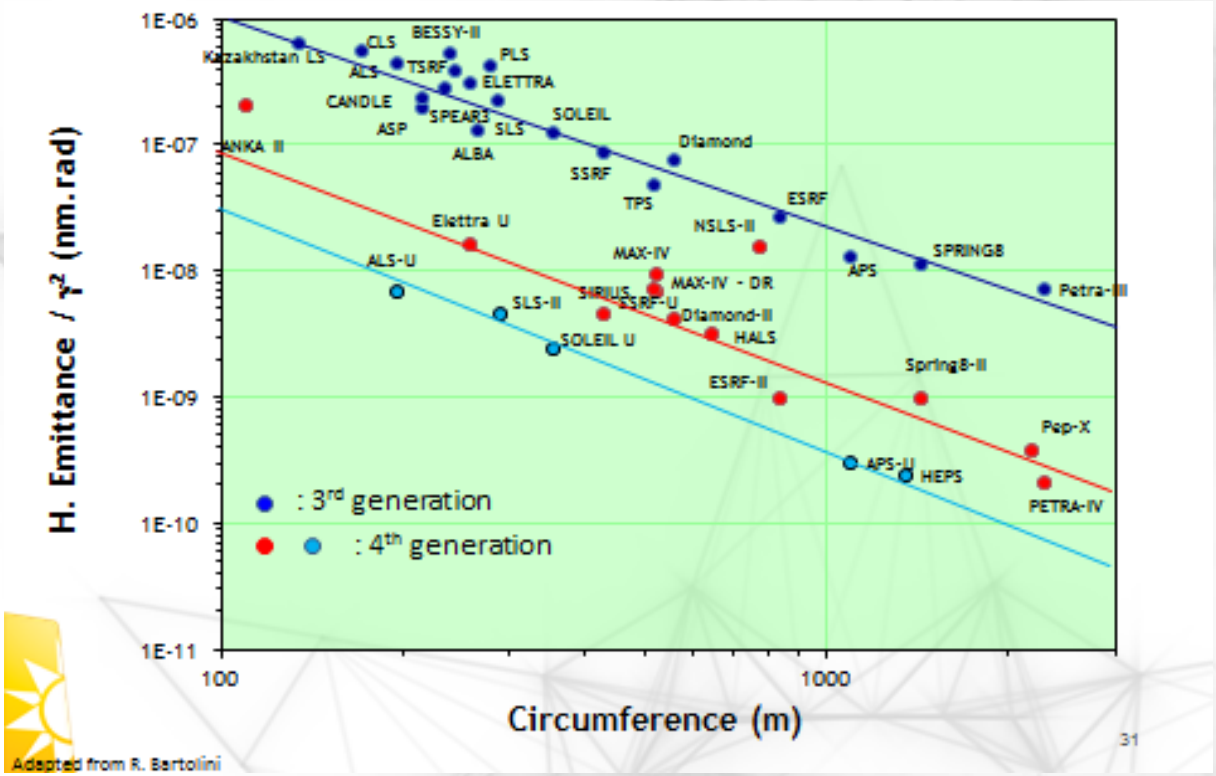
Principle:
X Compton : 10- 100 keV
Low energy ring: 50 MeV
Fabry-Pérot cavity
Flux: 10^{12}-10^{13} ph/s



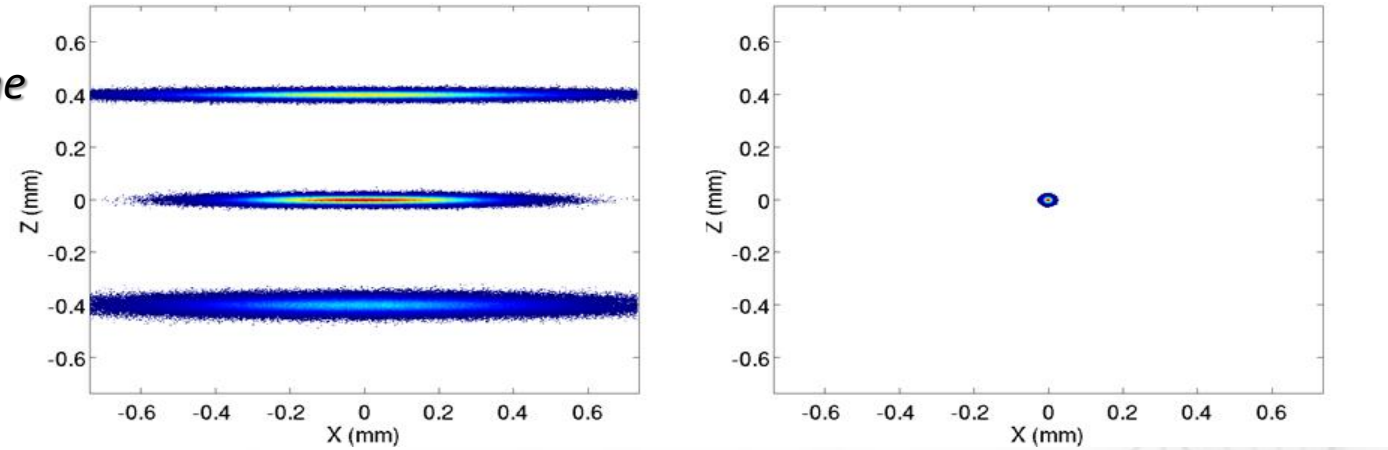
Under construction at LAL (ORSAY)

Towards 4th Generation Storage Ring

Evolution of the emittance



Evolution of the beam size



Timeline for the proposed upgrade

Date	Phase
Dec. 2016	Council meeting, presentation of the first proposal for an upgrade.
2017 - 2019	Discussions regarding the definition of the project (beamlines and storage ring); definition of objectives. Baseline Lattice defined.
2018 - 2019	Continuation of discussions and prototyping to assess feasibility of key options.
2019	**Decision to launch a Conceptual Design Report (CDR).**
2019-2020	CDR based on preliminary studies and prototyping.
2020	**Decision to launch a Technical Design Report (TDR).**
2020-2022	Technical Design Report.
2022	**Decision to start the project.**
2022-2025	Reconstruction of storage ring and beamlines.
2026	Restart of user operation.

RF system: is it the new Swiss knife for the storage ring?

- **RF** system used to compensate the energy loss of the particles due to synchrotron radiation.
- **RF** system for bunch lengthening
- **RF** system for bunch shortening
- **RF** system for injection
- **RF** system as a feedforward to cope with the transient beam loading.
- Development of **RF** Undulator-Based Insertion Devices for Storage Rings
- **RF** optimization is a strong function of storage ring performance priorities.

I wish you a successful Workshop

and

Enjoy your stay in PARIS