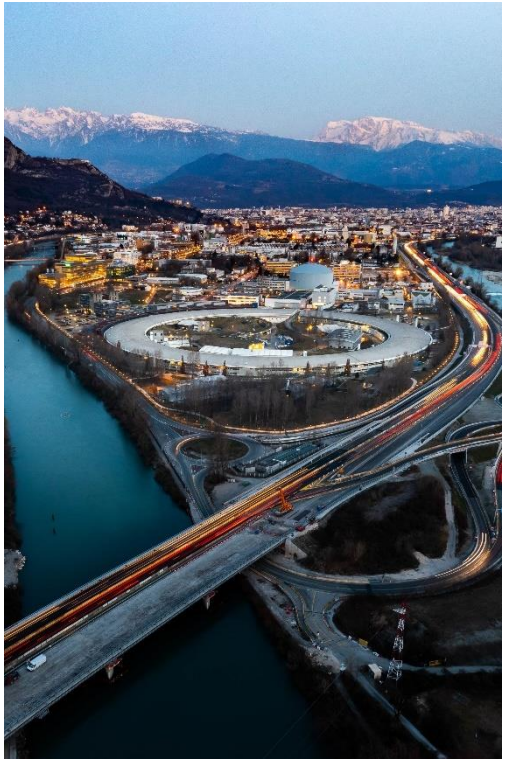


COLD: COOL COPPER OPERATION LINAC DEMONSTRATOR PROJECT

4-7 May 2026

Jean-Luc Revol

ESRF | The European Synchrotron

THE ESRF: FACT AND FIGURES

Ring-based Light source in operation since 1994, Grenoble, France

19 partner nations

- *Budget: ~120 million euros/year, Staff: ~700*
- *5500 hours of beam delivery to users*
- *1500 experimental sessions*
- *46 end stations*

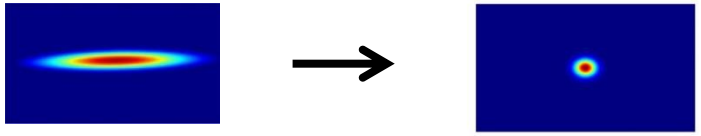
Upgrade programme 2009-2023 (2-phase):

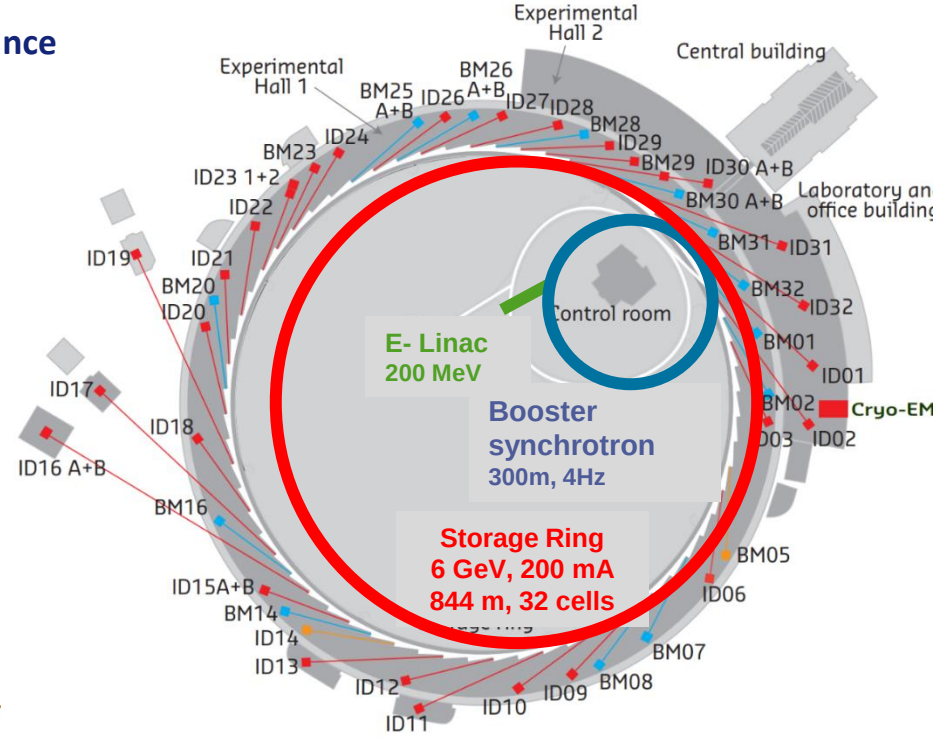
- *New beamlines*
- *Renew infrastructures and support facilities*
- *New storage ring (EBS)*

The **Extremely Brilliant Source (EBS) construction (2015-2020)**:

- *Decrease the horizontal emittance*
- *Increase the source brilliance*
- *Increase the source coherence*
- *Keep as much as possible of the infrastructure & components*
- *Minimize operation costs, particularly wall-plug power*

4000 pm.rad → 133 pm.rad





Limited upgrade of the injector & same injection scheme in SR kept

- ➔ Reduced injection efficiency
- ➔ Perturbations at injection
- ➔ Reliability issue

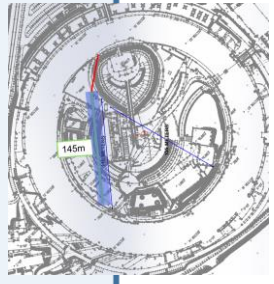
INJECTOR UPGRADE & COLD PROJECT

Long-term

Injector upgrade

COLD
Started ✓

NEW Linac



Replace existing injectors with a full energy injector linac

- Higher injection efficiency, lower injection perturbation, enable/facilitate future SR upgrades

SR Injection section improvement
Advanced ✓

Non-linear injector kicker
Transparent injections
Maintain injection efficiency

Booster refurbishment
Procurement ✓

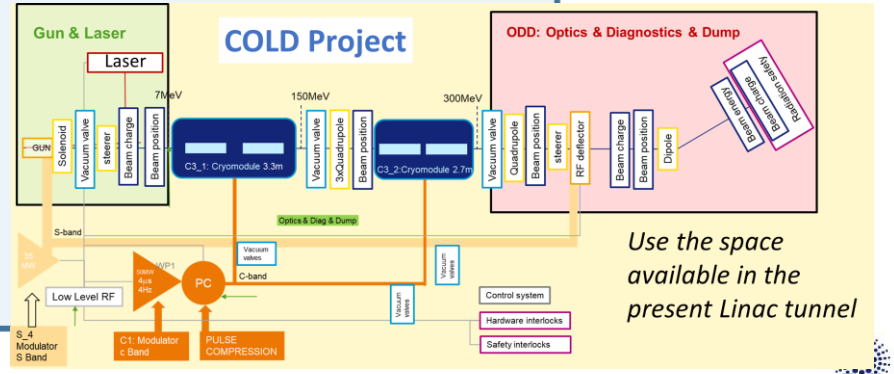
Lower natural emittance
Higher injection efficiency in SR
Higher extraction efficiency

Linac refurbishment
Procurement ✓

More reliability
Modernization

Medium term

COLD: 300 MeV demonstrator project organized in 3 phases, <u>status</u>: launched



Use the space available in the present Linac tunnel

PLANNING

Date	Instrument added to the installation	Beam achievements	project
2026-Dec SD	**ModS4- RF-unit (SAT)**		*Phase 0*
2027-May SD	**First C-band RF-unit**		*Phase 0*
2027-Aug SD	**First C-band Acc. Struct.**		*Phase 0*
2028-May SD	**Infrastructures installation**		*Phase 1*
2028-May SD	**Diagnostics and beam dump**		*Phase 1*
2029-Jan SD	**S-band photo-gun + laser**	***7MeV photogun beam***	*Phase 1*
2029-May SD	**Beam in Acc. Struct.**	**150MeV beam**	*Phase 1*
2030-May SD	**RF deflector**	***2ps bunch length***	*Phase 1*
2029-Dec SD	**Acc, structureSecond C-band**		*Phase 2**
2030-Sep	**Beam in Acc. Struct.**	**300MeV beam**	*Phase 2**
2031-Aug SD	**TL1 Upgrade and inject in booster**	**300MeV beam to booster**	*Phase 3**