

PERLE Plans

Orsay, October 28th 2022
Achille Stocchi



PERLE Timeline for TDR phase and beyond

Bit of redefinition with the introduction of a P2B phase in parallel of the TDR phase

The current phase of the project:

Technical Design phase (→ 2023)

Prepare to Build phase (P2B) (→ 2025)

- Machine design (Injector, 250MeV and 500 MeV configurations)
- Beam dynamics studies
- Main systems design (Buncher, Magnets, HOM couplers, full dressed cavity, power couplers, new CM, IP, dump...)
- In-Kind adaptation and/or upgrade studies (DC-Gun, Booster, SPL CM) *
- Definition of the needs (Diags, Cryogenics, CC, LLRF, Shielding, machine interlock system, infrastructure...)
- Experiments with PERLE beam and their specific needs

** Design of some systems could continue after TDR publication*

- DC-Gun reinstallation and test
- Equipment specifications (for DC gun)
- Prototyping and tests (HOM couplers, Single cell booster cavity, B-COM magnet, 5-cells Nb Cavity) *
- In-Kind adaptation and/or upgrade **work** (DC-Gun, Booster, SPL CM)
- PERLE administrative regime (Dossier ASN)
- Infrastructure (site investigations and work)

** Prototyping results could be included in the TDR phase if available*

At this workshop some nice results/news have been presented. A solid project group is formed and is continuously increasing



Recent News/and next to come: Finances.

- **TDR Phase 2022-2023**, Consolidation with IJCLab/IN2P3.
- 2M€ from CPER for infrastructure, maybe not sufficient for the full infrastructure works. Search for extra funding.
- **PEPR** for the PERLE Phase I **under construction**; Deposit of the project with CNRS (INP, IN2P3) and CEA on going.
- **Contributions from other countries** so far only in-kind (e- source, booster to be discussed, SPL to be discussed). Finances to be discussed, within PERLE and through the newly formed ERL coordination group.



Financial support (~800k€)

- CDD/PHD (IN2P3, EU, Univ)
- For equipment (IN2P3, CERN, ~~Cremlin~~+ EURIZON)

	Total Requested 2022	Total Requested 2023
Personnel (CDD)	115 k€	161,5 k€
Equipment + Others	141 k€	341 k€
Missions	31,6 k€	29,5 k€

Recent News and next to come : HR

- **Strong increasing in 2022 of the manpower at IN2P3 (IJCLab-Orsay and LPSC-Grenoble)**
- Collaboration agreement foresees/demands bilateral MoUs of IJCLab/IN2P3 with PERLE partner institutes about resource loaded (financial, material) contributions ICRADA now signed and a base for such an agreement with Jlab.

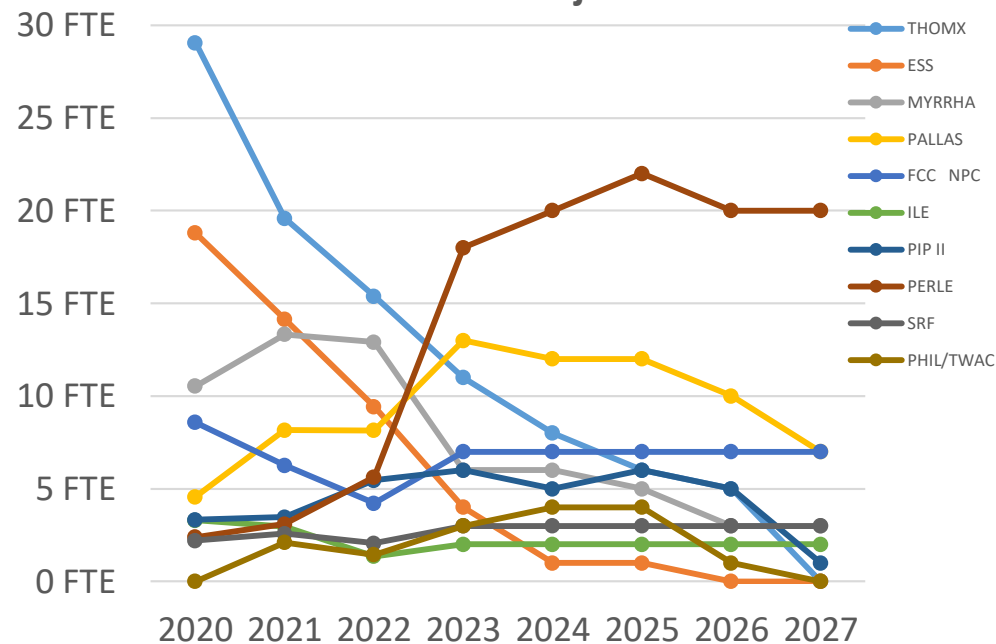


HR involvement and projection increasing in France.

		2020	2021	2022	2023	2024	2025	2026
Mechanic	Mechanical design			0,6	1,1	1	1	1
	Thermal & mechanical calculation				0,3	0,5	0,5	0,5
	Assembly, integration, Validation & tests				0,2	0,4	0,5	0,5
Electronic	Aquisition system architecture				0,2	0,3	0,5	0,5
	Electrical architecture				0,2	0,3	0,5	0,5
	Electrotechnics			0,1	0,3	1,5	1,5	1
	Assembly, integration, Validation & tests			0,05	0,15	0,5	0,5	0,5
Computing	Software development for instrumentation				0,1	0,3	0,5	0,5
	Data management				0,3	0,3	0,5	0,5
	Controle & Commande			0,1	0,2	0,3	0,3	0,3
	Software engineering				0,2	0,3	0,3	0,3
Accelerator	Accelerator Design	1	1	2,7	5,3	4,3	5	4
	Beam diagnostics			0,15	0,55	0,6	0,6	0,6
	Magnets			1,2	1,3	1,8	1,3	1,3
	Optical system			0,2	0,4	0,4	0,4	0,2
	Laser system			0,15	0,3	0,3	0,3	0,3
	Vacuum system			0,05	0,7	0,7	0,7	0,5
	Cryogenics			0,2	0,45	0,45	0,5	0,5
	RF system		1,2	1,9	2,7	3	3	3
	Installation and test (DC Gun)			0,4	1	1	1	1
	Infrastructure	Installation and maintenance of experimental local			0,1			0,3
Management	Technical responsible- Project leader	0,4	0,4	0,5	0,6	0,7	0,7	0,7
	Project supervisor		0,1	0,15	0,2	0,2	0,2	0,2
	System engineer		0,2	0,5	0,6	0,6	0,6	0,6
	Quality management			0,1	0,5	0,5	0,5	0,5
Prevention & radioprotection	Accelerator radioprotection			0,3	0,5	0,5	0,5	0,5
Total (FTE)		1,4	2,9	9,45	18,35	20,75	22,2	20,3

- Very large increase in the last months
- 4 PHD thesis on going !
- Detailed work on going in IJClab on HR (see plot below)

Main Accelerator Project at IJClab



Two main comments

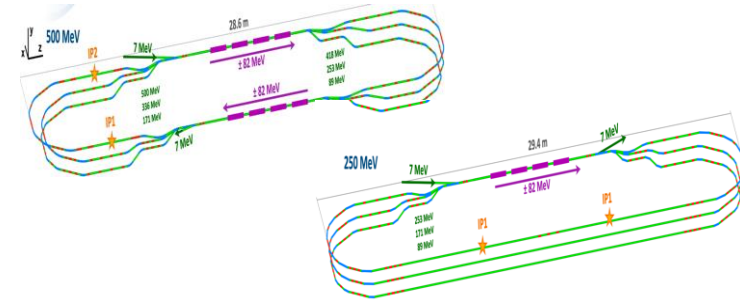
- The **French effort** can / could increase
- **Clear engagements of other partners** needed very soon



Branching decisions to take in the next (few) months.

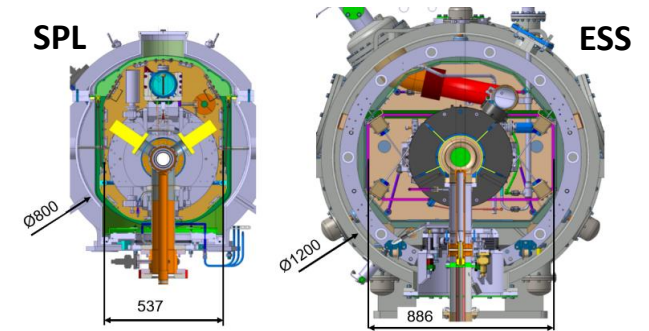
250 MeV/500 MeV machines: should we keep two phases scenario ?

Detailed studies on the 250MeV wrt 500 MeV machine to evaluate the pro/cons staging phases considering that the two machines are somehow different (compatibility, demonstration, commissioning, time to upgrade...)



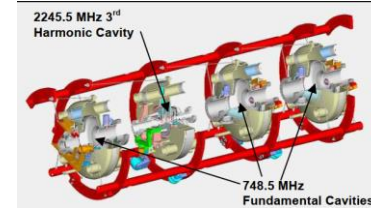
SPL (in-kind CERN) or ESS Cryomodule ?

Expected material (quite a lot of Missing components) and funding from CERN not available. ESS cryomodule as a backup solution. The two solutions under detailed studies. Some nice feature of ESS cryomodule : more space inside (+40cm in diameter), More transversal space between cavities, Shorter by ~1m; No supporting system between cavities, last no least...Design validated (prototypes and some series cryomodules already tested at CEA and IJCLab)



Can we reuse the Jlab Booster (the module and its valve box) ?

Cavity packages must be changed because of the frequency), Reuse of existing components (space frame...), Cryogenic capability, Alignment, Cost of refurbishing (including disassembly/reassembly, transportation, modifications on the vacuum vessel...)





Some final comments.

Considering the very nice progress in the last year,

→ soon (let's say spring/summer 2023) PERLE timeline would depend on the money flow and on the engagements of the other partners.

As an example : **Cavity developments**

Timeline (in a perfect world...money is pouring, no delays...)

	2022				2023				2024				2025	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
<i>Cavity prototype</i>														
Nb procurement and production														
Cavity fabrication														
Cavity preparation and test														

➤ FINANCIAL SUPPORT :

- Many actions internally in France are going on.
- Contributions from other countries so far only in-kind

➤ HR CONSOLIDATION :

- In France consolidation is on going and should be further increased
- We need more engagements from international partners

❖ Collaboration agreement foresees/demands bilateral MoUs of IJCLab/IN2P3 with PERLE partner institutes about resource loaded (financial, material) contributions ICRADA now signed and a base for such an agreement with Jlab.

❖ Finances and HR consolidation to be discussed, within PERLE and through the newly formed ERL coordination group.

❖ We should explore EU ways for getting part of the financial support (discussions / actions)