PERLE Status Meeting

18 July 2019

PERLE Status:

- Transfer of ALICE electron gun and related equipment from Daresbury to LAL on May 10th 2019.
  - → Material currently stored in the Super ACO experimental hall.
  - → Re-installation of the DC gun is not foreseen before 2021.
- Interesting progress in injection line design and beam transport toward it is made in the framework of Ben Hounsell PhD work. Some of the results were presented at IPAC19 conference (poster session):
  - → 2D POISSON model of the electron gun upgrade optimised for 500 pC bunch charge at both 220 kV (polarised) and 350 kV (unpolarised) electron beam.
  - → Transport optimisation up to the booster exit with transverse emittances in the range of 2.7- 4.0 mm mrad depending of the trade offs made: transverse distribution still more tailed then desirable and longitudinal phase space less linear than it would be.
  - → Code to optimise the transport including the murger is in place and simulations will start soon.
- Ben will move to Orsay on September 2019 for 2 years.
  - → 3D model of the electron gun + investigation on beam transport + booster design + start to end simulation by matching injector to the PERLE lattice.

PERLE Status:

- A HOM review meeting with participation of CERN and JLAB colleagues is foreseen mid-September at CERN.
  - → A post-doc was hired at Orsay to work on HOM issue and other related full equipped cavity issues.
  - → Progress in the full dressed cavity is in standby.
  - → The SPL cryomodule design and adaptation is also in standby.
- A second post-doc position is currently published (Beam dynamics profile).
  - → will work on the staging scenario (lattice adaptation to the 1 CM scenario in collaboration with JLAB)
  - → collective effects in the multi-turn approach (CSR, microbunching…)

- LAL/IPNo and BINP-Novosibirsk applied for the H2020 European program (CRIMLINplus) and ask for fund for dipole design & prototyping and for a post-doc position.
  - → Result of the call will be known on October 2019.

Status of the DC gun and injection line:

- PERLE was presented in the joint LAL-IPNo scientific council as the next big accelerator project of the future big lab at Orsay (LAL, IPNo and 3 other labs will merge to into a unique one starting from January 2020). Project achievements, progress, project phasing and timeline, cost estimation and needed manpower were presented to international accelerator expert members.

Project staging strategy:

The PERLE configuration entails the possibility to construct PERLE in stages. We propose in the following two main phases to attend the final configuration.

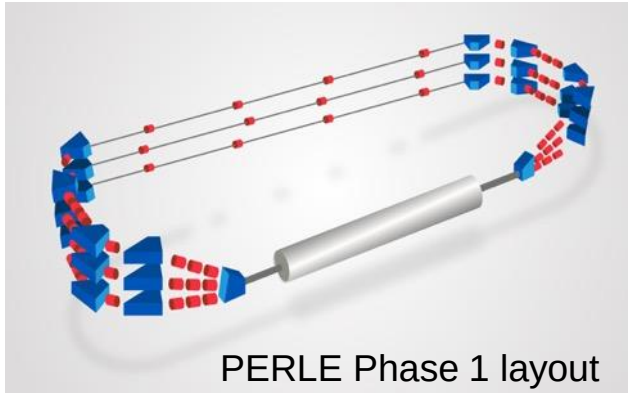
Phase 1: Installation of a single cryomodule in the first straight and three beam lines in the second (consideration motivated by the SPL cryomodule availability)

→ To allow a rather rapid realisation of a 250 MeV machine.

→ To test with beam the various SRF components.

→ To prove the multi-turn ERL operation.

→ to gain essential operation experience.



PERLE Phase 1 layout

Phase 2: Realisation of PERLE at its design parameters as a 10MW machine:

→ Upgrade of the e- gun

→ Installation of the 2nd Spreader and recombinar

→ Installation of the second cryomodule in the second straight.

PERLE Phase 2 layout

Project staging strategy:

Phase 1 is divided in two sub-stages:

- **Studies and prototyping stage**: Mainly for design completion of the main sub-systems, the beam dynamics studies and the prototyping of the main components (cavity, power coupler, HOM, dipoles…). All the outcomes will be included in the **PERLE Technical Design Report**.
- **Assembly, test and installation stage**: of all the subsystems according to their final design (injection line most likely without the upgrade of the DC gun, the SPL cryomodule, the 6 arcs, a spreader & a recombiner), leading to PERLE-Phase 1 configuration.

It is foreseen that phase 1 includes also the realisation of infrastructure work and the installation of equipment sized as for their final use (beam dump, cryogenics, cooling circuit, shielding, electrical power, etc.).

Project staging strategy:

Milestones, Timeline & Collaborator Involvement

Phase 1

	Milestone	Targeted date	Collaborator(s) Involvement
Studies & prototyping	Dressed cavity design completion	Oct 2019	CERN-JLAB
	SPL cryomodule design completion	May 2020	CERN
	Injection line design completion	Mid 2020	STFC-Univ. Liverpool
	Final design cavity fabrication and V. test	Mid 2020	JLAB-CERN
	Arc and switchyard dipole prototypes	End 2020	BINP Novosibirsk
	Booster cryomodule design completion	End 2021	-
	Technical Design Report	End 2021	All
Ass., test & installation	DC gun installation (1)	Early 2021	STFC
	Booster assembly & RF test (2)	Mid 2023	STFC
	Injector installation & commisionning (3)	End 2023	STFC
	SPL cryomodule assembly and RF test (2)	Early 2024	CERN
	Sequential installation at Orsay (4)	End 2024	-
	Phase 1 operation	2025	Open to all

Phase 2

Milestone	Targeted date	Collaborator(s) Involvement
DC gun upgrade	2026	STFC
Second cryomodule completion	2027	CERN
PERLE phase 2 operation	2028	Open to all