



International
UON Collider
Collaboration



WP3 Proton Driver

Muon Collider kick-off Meeting
March 28th, 2023

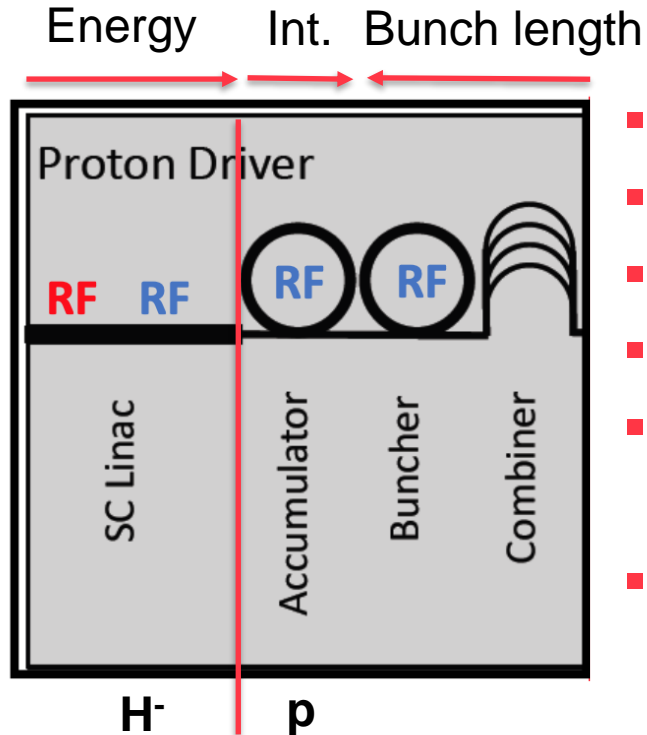


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Basic elements

H- source and accumulator and combiner complex
 10^{14} - 10^{15} protons in ns-long bunch



- H⁻ source → high intensity
- Few GeV → Superconducting Linac (SNS, ESS)
- Accumulator
- Buncher/Compressor
- Combiner → target delivery system
- **Challenge:**
High intensity short bunches @ low rep. rate

Baseline Parameters

- Beam Power: 2 MW
- Rep. rate: 5 Hz
- Beam spot size: ~ 5 mm (1σ)
- Bunch length: 2 ns (rms)
- Beam Energy: 5 and 10 GeV (initial investigation)
- Linac + 2 rings (initial design)

From initial discussions with WP4

WP coordination

- Coordination and Communication: Natalia Milas (WP leader) and Simone Gilardone (WP deputy)
- Task 3.1 – High power linac: Alessandra Lombardi (task leader)
- Task 3.2 – Compressor ring design: Emanuele Laface (task leader)

Tasks

- Task 3.1 – Linac and transfer lines.
 - Collect the parameters that can be used for a future design of a high-power H-Linac (ESS and the SPL/LINAC4)
 - source type
 - preliminary acceleration layout
 - beam dynamics and stability considerations
 - chopping schemes
 - Provide input beam for the accumulator/compressor rings
- Challenges:
 - H- source: needs further studies/R&D (input from RAL and STFC)
 - H- stripping
 - H- injection stripping

Tasks

- Task 3.2 – Compressor ring design
 - Provide a self-consistent collection of parameters to be used in the design of a future compressor ring.
 - Preliminary design of the rings will be developed including accumulation and compression strategy, preliminary lattice and injection and extraction considerations.
 - Further R&D needs will be outlined and eventually beam measurements at CERN or other facilities might be proposed.
 - Preliminary study of intensity-based effects such as space charge, single-bunch and impedance effects will be carried out for the compressor ring.
- Challenges:
 - Collective effects and high intensity limitations
 - Compression scheme
 - How to keep the beam quality between ring and target

Deliverables and Milestones

- M3.1 - Update for the proton complex parameters and review with WP4 - M13 (report)
- M3.2 - Preliminary report on the linac and accumulator work – M33 (report)
- D3.1 - Final report on parameters and study of the preliminary scenario for the Proton Complex - M45

Risk Analysis

Hiring difficulty (medium, high)	All	To exploit hiring strategies (websites, Professional networks, socials etc...) of all the participating Institutes to enlarge as much as possible the platform of publication of open positions.
Unilateral withdrawal of a Partner (low, medium)	WP1	The Consortium has a wide coverage of every necessary competence. Withdrawal for any reason of one of the partners will be mitigated with the reassignment of resources to another partner having the necessary competences. The decision will be taken at the Governing Board level.
Significant delay on deliverables (low, medium).	all	Progress will be regularly monitored via the Management Board and achievement of Milestones and Deliverables. Appropriate measures, if necessary will be addressed by the Governing Board
In the course of the study we find that a certain parameter required by the target (WP4) cannot be achieved by the Proton Complex (Medium, high)	WP3/WP4	the two WPs will have regular common meetings. Tradeoffs on performances may be analysed and discussed in the management committee for the evaluation of the overall impact.



Collaborators

- High power linac design: ESS, CERN, SNS, JPARC
- H- sources: CERN, SNS, JPARC, STFC
- H- injection: SNS and JPARC
- Ring design: UU, CERN, STFC
- Beam Instabilities and Collective effects: CERN

Thank you!