



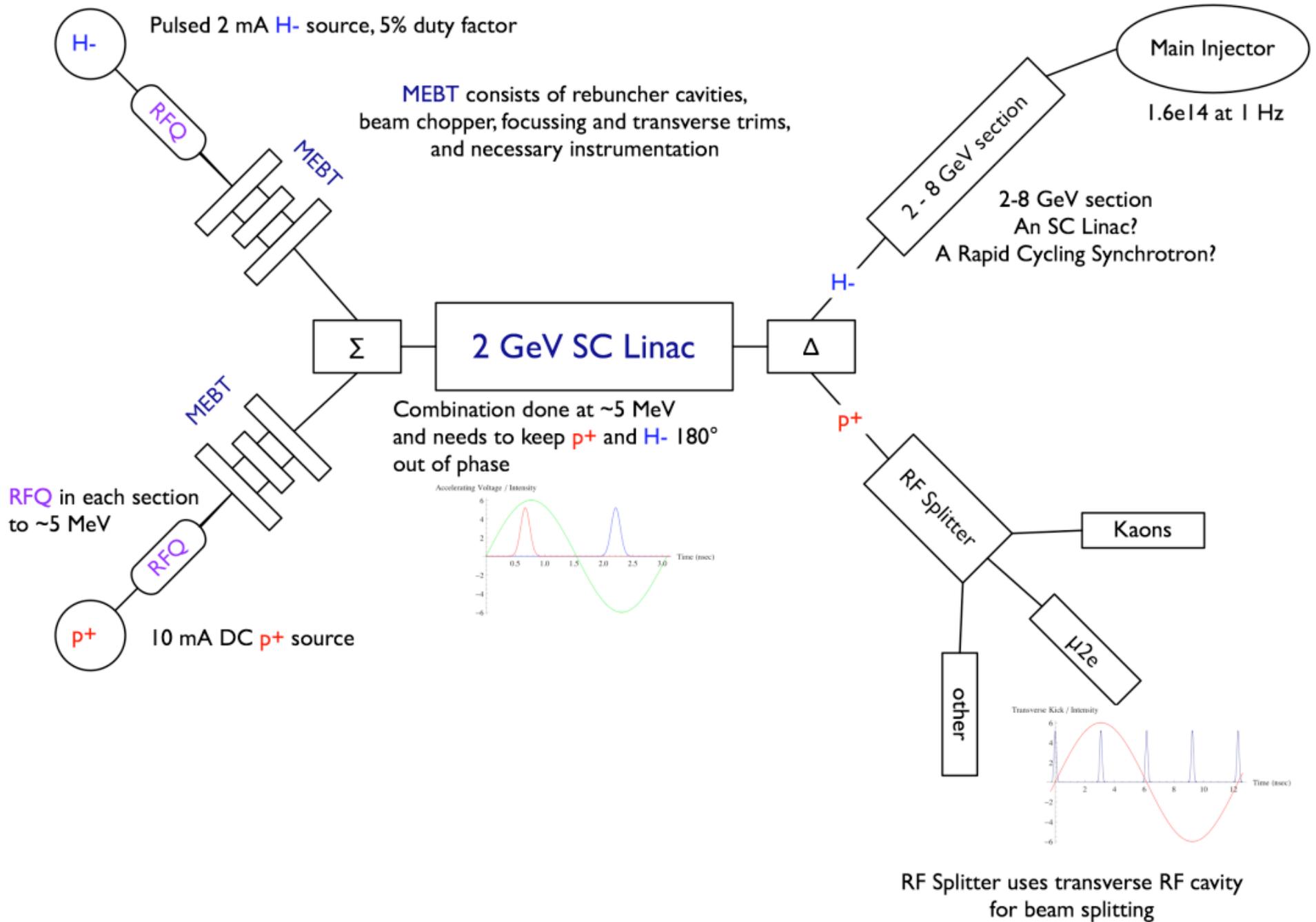
Project-X ACD Write-up

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Fermilab

General machine layout



Present Understanding of the ACD

■ Physics case

- ◆ Interim report today
- ◆ Final report the end of June
- ◆ Two experiments
 - Mu2e and rear kaon decays, $\Sigma \approx 1$ MW
- ◆ Need another credible experiment/user for ≈ 1 MW
- ◆ Particle yield estimate requires additional work

■ For now we assume

- ◆ CW linac: 2 GeV, 1 mA, 2 MW, 1.3 GHz
 - Intensity control for each bunch, $I_{\max} = 10$ mA
- ◆ 2-8 Acceleration
 - first choice RCS, 10 Hz, 2 A beam
 - Pulsed linac, 20 Hz, 2 ms, 1 mA = 40 (mA ms/s)
 - \Rightarrow Cycle time per second is 13 times longer than for ICD
- ◆ 3 halls (experiments)
 - Power distribution (0.5 + 0.5 + 1) MW \Leftrightarrow (1+1+2) bunches

Status of Accelerator Proposal

■ Synchrotron

- ◆ Good understanding for most of systems. Can start writing.
 - Presentation has all important details
- ◆ W. Chou proposal has problems with details (tunes, vacuum chamber heating, large magnetic field). It is unclear how large changes are required and should we carry out this work now. But it should not replace Debuncher!!!

■ Pulsed linac

- ◆ What is affect of pulse lengthening on the cryogenic and RF systems

■ CW linac

- ◆ There is very rough understanding
- ◆ General structure is the same as ICD 2 GeV counterpart
- ◆ The first level questions to be answered
 - Do we stay with the same "very long cryo-module" design
 - Break points between different accelerating structures

ACD Contents

- I. Introduction (Draft is ready)
- II. Technical Goals and Assumptions
Paul Derwent (lead),
Sergei Nagaitsev, Valeri Lebedev, input from B. Tschirhart
- III. Requirements and Initial Configuration of Major Subsystems
 - a. Physics design
 - b. Subsystem design and configuration
- IV. References

III. Requirements and Initial Configuration of Major Subsystems

Physics design, integration: S. Nagaitsev (lead)

1. Beam physics design (CW linac, ion source to 2 GeV): N. Solyak (lead)
 - a. Break points between different accelerator structures
 - b. Limitations for parameter choice
2. Beam physics design (RCS, 2-8 GeV): V. Lebedev (lead)
 - a. Optics, instabilities, beam loading, limitations for parameter choice
 - b. Injection and extraction to and from RCS, beam abort, D. Johnson (lead)
3. Beam physics design (pulsed linac, 2-8 GeV): J-P. Carneiro (lead)
4. Physics design: proton beam-lines (at 2 GeV), RF deflector and target halls: P. Derwent (lead)
5. Recycler/MI physics design: I. Kourbanis (lead)
6. Upgrade path: V. Lebedev (lead)

Subsystem requirements and configuration: P. Derwent

7. CW linac
 - a. Front end (ion sources, RFQs, MEBT, combiner dipole): **B. Webber** (lead)
 - b. Low energy acceleration (optimization of spoke cavities), **S. Yakovlev** (lead)
 - c. CW linac cavities and cryo-modules (includes RF deflector): **M. Champion** (lead)
 - d. All RF power to 2 GeV: **R. Pasquinelli** (lead)
8. RCS:
 - a. Magnets (including injection magnets and correctors), **V. Kashikhin**
 - b. RF, **J. Reid**
 - c. Power supplies and resonant excitation of the dipoles and quadrupoles
 - d. Pulsed power supplies (kickers, septa),
 - e. Vacuum system, **L. Nobrega**
 - f. Scrapers and dumps (how large shielding is required), **N. Mokhov**
9. Pulsed linac
 - a. cavities and cryo-modules: **J. Kerby** (lead)
10. All beam transport lines (2 GeV and 8 GeV): **D. Johnson** (lead)
11. MI/RR: **I. Kourbanis** (lead)
12. Pulsed RF power (1.3 GHz): **J. Reid** (lead)
13. Cryogenics: **A. Klebaner** (lead)
14. Instrumentation: **M. Wendt** (lead)
15. Controls: **J. Patrick** (lead)
16. LLRF (entire facility): **B. Chase** (lead)
17. Safety and radiation shielding, **T. Leveling**
18. Conventional facilities, siting: **E. McCluskey** (lead)

The plan

- We want a DRAFT in 1 month
- Final document by Aug 1
- Cost estimate complete by Sep 1

Organization

- Weekly meetings, Tuesday, 2 pm, Penthouse
- Writing does not automatically implies that all work has to be done by the lead person

To proceed with CW linac

- Better understanding of general structure
- Discussion in a week

Not for discussion yet

