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Feasibility Study-II
Technical and Cost Group
Definition of Work

0. Issues to Resolve

   - Design of Proton Driver capable of 1 ns bunch length (Design B)
   - Specifications and layout for channel with initial RF phase rotation (Design B)
   - Storage ring options (detector baseline distance, number of straights, E_{final})
   - Specifications of solenoids in terms of required field profile, beam stay clear, and required uniformity/tolerances

1. General

   - Specify all required technical components in sufficient detail for a top-down cost estimate
   - Iterate component designs with Parameters Group to ensure realistic specifications for all devices
   - Prepare layouts and drawings, using CAD if possible (CAD cartoon $\Rightarrow$ "realism")
   - Develop, with engineering help as needed, a top-down cost estimate for each area of responsibility; look for opportunities to adopt common designs
   - Define R&D activities needed to validate concepts

2. Target Area

   - Define required apparatus, including

     Target
     Target solenoid
     Matching solenoids
     Beam dump
     Shielding
     Hot storage
     Remote handling equipment and features

- Specify geometry and layout of Hg target, proton beam, and beam dump [drawings]; indicate R&D needs
- Update target solenoid design for hollow copper conductor [drawing]
- Update matching channel solenoid design as needed [layout and component drawings]
- Define required vacuum systems [include in layout]
- Define required diagnostics
- Update target facility design from Study-I as needed to accommodate Hg target, considering target changing and storage, safety and ES&H aspects; indicate R&D needs

3. Initial Phase Rotation and Decay Channel

- Define magnet layout [drawing] and cross section [drawing] for Drift; leave space for services and consider quench protection
- Define vacuum system approach [include in layout]
- Evaluate radiation levels from target area and pion decays; assess shielding needs
- Specify RF cavity design(s) [drawing], power source [footprint/layout], and R&D issues for initial phase rotation system (NOTE: not needed for Design A)
- Evaluate beam polarization (NOTE: not needed for Design A)

4. Final Phase Rotation and Minicooling

- Update induction linac 1 and 2 and pulsed power system designs for Study-II parameters [layout and cross section drawings; waveform calculations]
- Update internal superconducting (SC) solenoid design for Study-II parameters
- Specify solenoids for field reversal section [layout and component drawings]
- Define vacuum system approach [include in layout]
- Define mini-cooling absorber and layout [drawing]
- Evaluate beam polarization (NOTE: not needed for Design A)

5. Matching and Bunching

    - Define magnets and layout for matching section [drawing(s)]; specify R&D issues
    - Define vacuum system approach [include in layout]
    - Specify RF cavity (201 and 402 MHz) and window designs [drawings], power source [footprint/layout], and R&D issues for buncher system
    - Evaluate beam polarization (NOTE: not needed for Design A)

6. Cooling

    - Specify NCRF cavity concepts for baseline design (Be window, 4-cell and 2-cell) [drawings]; indicate R&D issues
    - Specify RF power source for baseline design [layout, "plumbing"]; indicate R&D issues
    - Specify designs of LH_2 absorbers, especially windows [drawings]; indicate R&D issues
    - Produce layout of channel [drawing], including RF, cryogenic, and LH_2 feeds, vacuum system, mechanical supports, and diagnostics
    - Evaluate beam polarization (NOTE: not needed for Design A)

7. Acceleration

    - Specify first pre-accelerator linac, including NCRF cavities and power source, solenoids, vacuum system, mechanical supports, cryogenics, and diagnostics [layout and cross section drawings]
    - Specify second pre-accelerator linac, including SCRF cavities, quadrupoles, vacuum system, mechanical supports, cryogenics, and diagnostics [layout and cross section drawings]
    - Define first RLA components, including SCRF cavities and power source, optics, magnet designs, especially splitter and recombiner magnets, mechanical supports, cryogenics and diagnostics [layout and cross section drawings]
    - Define second RLA components, including SCRF cavities and power source, optics, magnet designs, especially splitter and recombiner magnets, mechanical supports, cryogenics and diagnostics [layout and cross section drawings]
    - Examine cost tradeoffs as a function of transverse acceptance and energy spread

- Assess radiation effects on cryogenic components
- Evaluate beam polarization (NOTE: not needed for Design A)
- Specify R&D issues for all items

8. Storage Ring
    - Define lattice optics and layout [drawings]; include some space for utility straights
    - Evaluate lattice design that could “stretch” from 20–50 GeV
    - Specify required magnets (dipoles, quadrupoles, sextupoles, correctors), vacuum system, mechanical supports and diagnostics
    - Assess radiation effects on components
    - Evaluate beam polarization (NOTE: not needed for Design A)
    - Specify required R&D activities