Study-II Cooling Channel Action List

Michael S. Zisman
CENTER FOR BEAM PHYSICS

Muon Collaboration Project Manager

MUCOOL Phone Conference
December 8, 2000

Outline

- **Action list**
- **Summary**

Action List

- **Simulations (Lebrun)**
  - **reproduce Palmer's baseline case in GEANT4 [by January 8]**
    - **baseline is stepped Be foil windows**
  - **must run from target through cooling channel**
    - **is there a need to change field in decay channel?**
  - **identify any unresolved issues**

Action List

- A few simulation issues that surfaced during the meeting are listed below
  - there is confusion on whether the emittance cut of 15 mm-rad is normalized or not (Lebrun thinks it's normalized)
  - Palmer used flat windows for the absorbers; this is unlikely to matter much, but Lebrun should start with this to reproduce the ICOOL results
  - Tollestrup has found a few errors in Palmer's parameter tables, and Fawley's program has been used at BNL to find a few glitches in the ICOOL input file; corrections expected next week
  - Wurtele suggested that particles from the cooling channel be passed on to the accelerator to make sure there are no interface errors; this is a good idea

Action List

- **Absorbers (Black, Kaplan)**
  - **check initial minicool absorber power handling**
    - **use updated numbers from H. Kirk**
      - **consider solid Be plate upstream to range out protons**
      - **hope to complete this in December**
  - **check and validate all cooling channel absorber parameters**
    - **window shape, thickness, diameter, material, heat load**
  - **freeze parameters on January 8**

Action List

- RF cavities [Rimmer, Li, Moretti, Black, Green, Miller]
  - confirm gradients and apertures and finalize parts count
  - define baseline cavity shape and window module design
    - estimate shunt impedance and power requirements
    - develop designs for input coupler and tuner
      - use common approach with SCRF if possible
      - examine FNAL design as backup
    - preserve (but do not use) LN_2 cooling option
  - develop workable mechanical layout that handles vacuum, cooling, alignment, and repair/removal issues [needs Black, Miller, Green]
  - freeze mechanical layout on January 8

Action List

- thereafter, define alternative foil parameters that give same ΔT to do crude performance optimization
  - validate all cases with ANSYS

Action List

- Confirm all magnet parameters
  - target, decay and phase rotation, cooling
- Need designs for all cryostats by time of January meeting
- Split work between Miller and Green
  - Miller takes lead for target and cooling channel magnets
    - must settle target solenoid insert design by mid-January
  - Green leads decay channel, phase rotation (induction linac) and buncher magnet designs
    - need heat loads for upstream part of channel (from H. Kirk)

Action List

- cooling channel requires Miller-Green collaboration
  - need close interaction with Rimmer and Black
  - must optimize adjacent coils in matching cells
  - must deal with off-normal forces (cryostat design)
  - must settle quench protection scheme

- Need written requirements/specifications finalized by January 8
  - need mechanical design concepts finalized by end of January (BNL meeting)

Action List

- **Diagnostics (Norem)**
  - **need diagnostics information from Norem for baseline description**
  - **this must be given to Black for incorporating into the layout**
    - **first cut should be done by January 12**

Summary

- We must begin to finalize parameters and layouts now
- This requires simulations being verified at FNAL for baseline case
  - and also that we do not lose focus now!
- With exception of minicool absorber, we should be able to freeze absorber parameters now
- RF design should proceed in parallel with simulation validation
  - design for stepped Be foils; leave flexibility for grid later
  - resolve mechanical conflicts with absorber design where possible, not with cavity or magnet design
- Cooling channel solenoid design should be based on passive mechanical protection from off-normal conditions
  - supports and cryostat must permit removal of an RF cavity and/or absorber
- Checking the interface between cooling and acceleration by sending particles all the way through should be done in January