Study-II Cooling Channel Action List

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Outline

• Action list

• Summary
• 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
• 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
    o 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
    o 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
— thereafter, define alternative foil parameters that give same $\Delta T$ 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