Front End: Issues and Plans

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Principle Tasks

- compare performance of existing NF schemes
- evaluate implications of reduced rf voltage
- continue search for optimized phase rotation/bunching systems
- evaluate trade offs of cooling vs acceptance
- evaluate performance and limitations of absorbers & windows

Existing schemes

- how well do our present designs perform?
- presently considering 6 schemes

  KEK
  CERN with horn
  ~CERN with solenoid
  ~RAL
  US Study 2a
  US FS2?
- will use 5 beam/target combinations

  4 GeV – C 40 GeV – C 10 GeV - Ta
  4 GeV – Hg 40 GeV – Hg
  start with relative comparison
  validate absolute values with HARP/MIPP later

Existing schemes (plans)

- make ICOOL models of all schemes
- put beam files and machine files on web
- run through all designs up to cooling with one beam file
- agree on proper figure of merit
  e.g. accepted muons per MW
- compare results with local groups
- cross-check codes if necessary
- add cooling channels to simulations
- compare results again
- check performance for other muon sign
- run through rest of beam-target cases

Existing schemes (issues & status)

- issues
  - should we examine all schemes with 2nd code?
  - what should we model for KEK?
  - straight lattice or 1st FFAG for longitudinal acceptance?
- have some beam files (Stephen Brooks)
- ICOOL file exists(?) for CERN scheme
  - ICOOL – PATH comparison (Barbara Holzer)
- have modified ICOOL to allow modeling CERN horns
- have written MUON1 to ICOOL converter
- working on improving ICOOL modeling of FFAGs

Reduced gradient

- what if we can't meet specifications on the rf gradient?
- what is "reasonable" gradient at 5, 40, 88, 201 MHZ?
- consider 75% and 50% of design gradient
- do this for one or two promising schemes
- reoptimize the design using the smaller gradient

  e.g. change lattice, amount of absorber, # of cavities

  try to recover some of the lost performance

Optimize phase rotation/bunching

- what is the best way to do phase rotation, rf or FFAG?
- optimize rf schemes
  - adiabatic or fixed design
  - e.g. change gradients, # of frequencies, channel length
- optimize FFAG schemes
- new optimization techniques could help
  - e.g. Alexy Poklonksiy (MSU/FNAL)
    - Stephen Brooks (RAL)
- agree on a proper figure of merit
- compare optimized designs

Cooling versus acceptance

- can we save money by reducing amount of cooling and increasing accelerator acceptance?
- need agreed-upon figure of merit for FE performance
  e.g accepted muons/MW
- need to develop scaling laws for costs
- R. Palmer & J.S. Berg have determined cost scaling for US FE, linac, RLA, non-scaling FFAGs
- still need to include
  - reduced costs for collection, phase rotation and bunching
  - storage ring costs
  - scaling FFAGs?
- results need to be critiqued by local groups

Absorber and window issues

- do practical considerations constrain our absorber & window choices?
- absorbers: LH2, LiH, Be
- rf windows: Be
- consider implications of keeping both muon signs
- start with literature review, some basic engineering analysis
- what can be done with additional R&D, more money?
- prepare list of issues and limitations for each design
- estimate resulting performance limitations

  might require some additional simulation work