IDS-NF Accelerator Working Group Status and Plans

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IDS-NF Plenary Meeting
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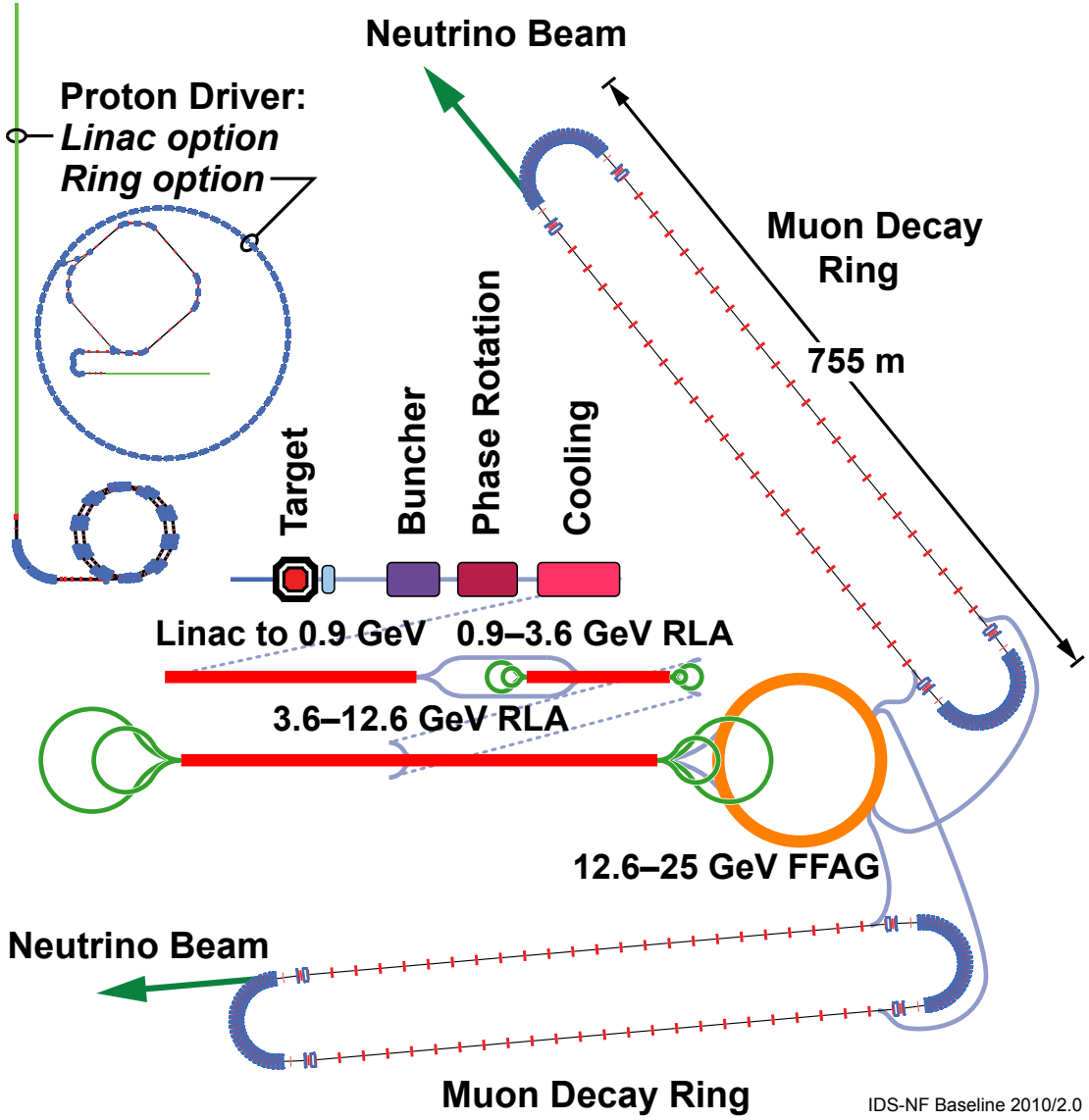
Goals

- Present final design configurations
- Begin planning work to be done for RDR

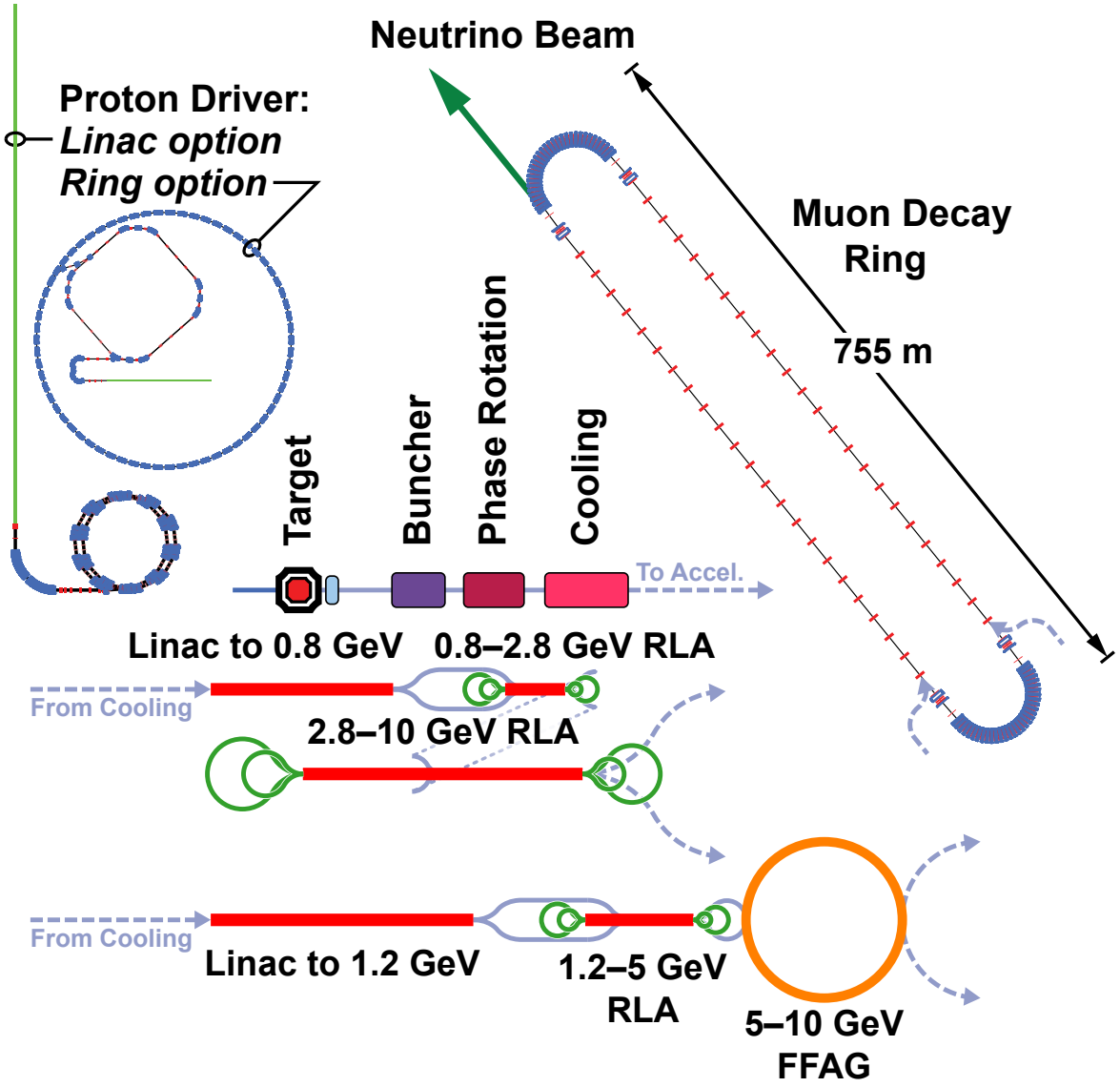
IDS-NF Accelerator Overview

- Proton driver, makes protons that hit
- Target, produces pions decaying to muons
- Front end, improves beam phase space distribution
- Acceleration, increases muon energy
- Decay ring, stores muons where they decay to neutrinos, directs them toward detector

The Good Old Days



Low Energy Indecision



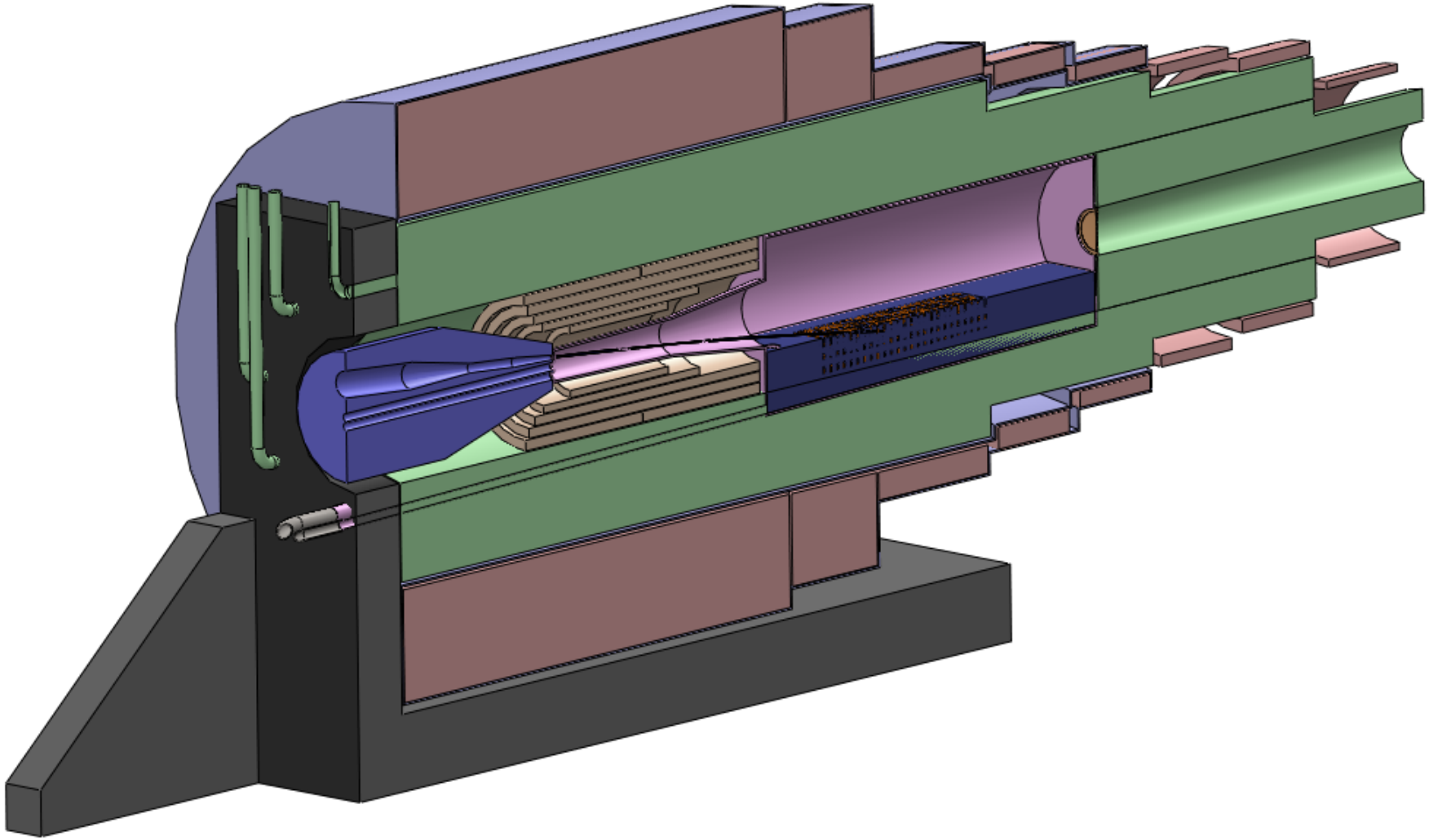
From Last Meeting

- Target design is still evolving. They will choose a snapshot for the RDR.
- Front end will decide whether to change baseline cooling channel
  - Concern is performance of RF cavities in magnetic field
- New final energy of 10 GeV; need a new acceleration chain
  - Decide between system with two RLAs and a system with one RLA and one FFAG

Target

- Have a transfer line design taking proton driver to target
- Target design is continuing to evolve
- We need to take a snapshot and finish it off for the RDR
  - Engineering considerations: prefer 15 T at target
  - 20 T design stable, well-studied: use this
- Problem with insufficient engineering resources

Target

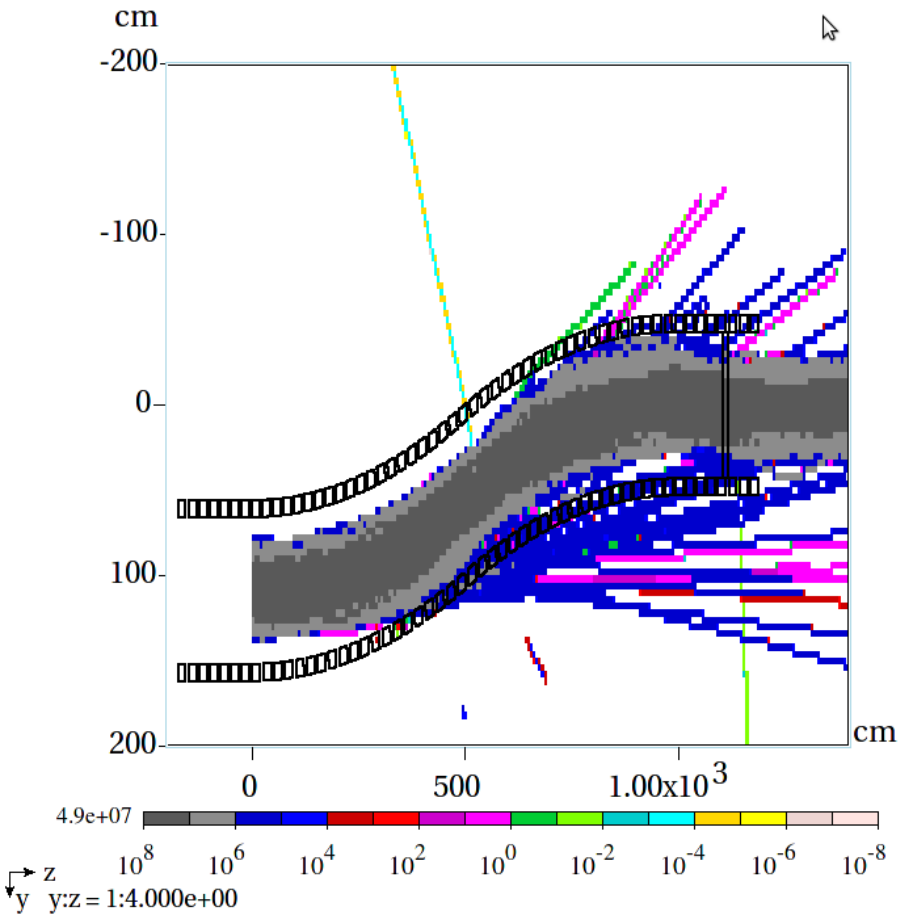


Front End

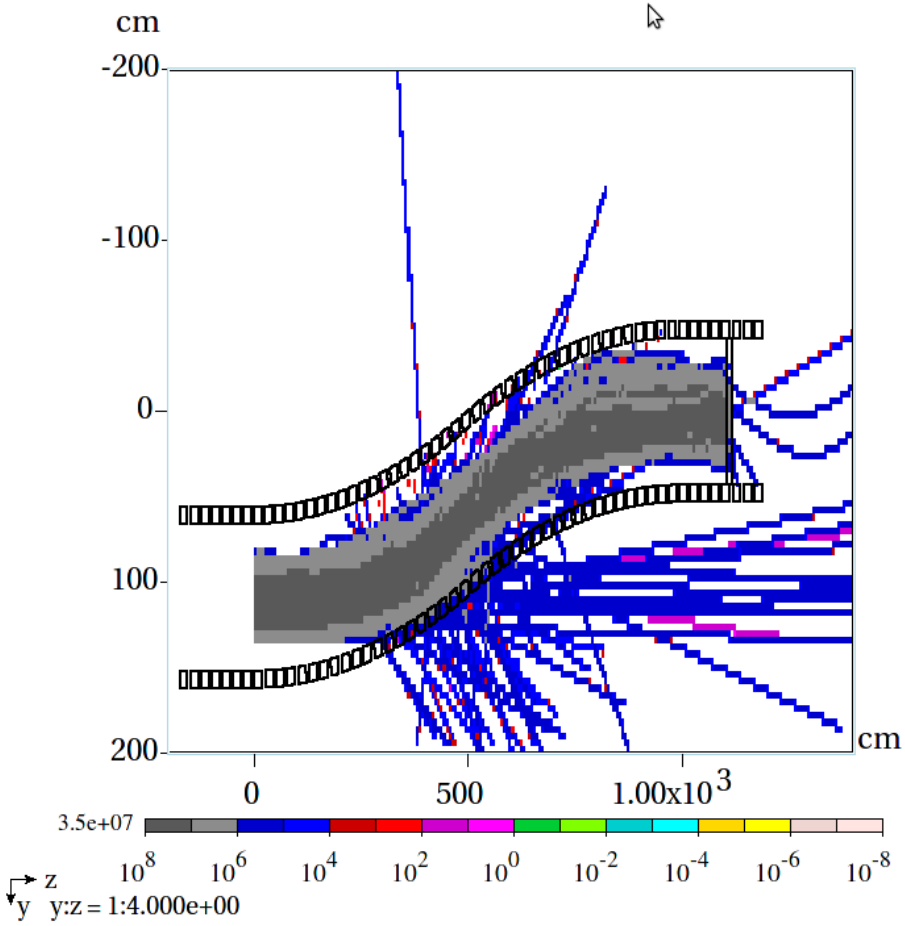
- Many modest modifications from IDR baseline
  - Chicane to remove unwanted particles (not so modest!)
  - Adjust buncher/phase rotator to accommodate chicane
  - Lattice modifications resulting from engineering constraints
- Considered alternative cooling lattices
  - Bucked coil in particular
  - Experimental results still don't tell us much
    - Gradient that can be acheived as a function of magnetic field on the cavities
  - Stay with previous (16 MV/m, large magnetic field at cavity) baseline

Front End

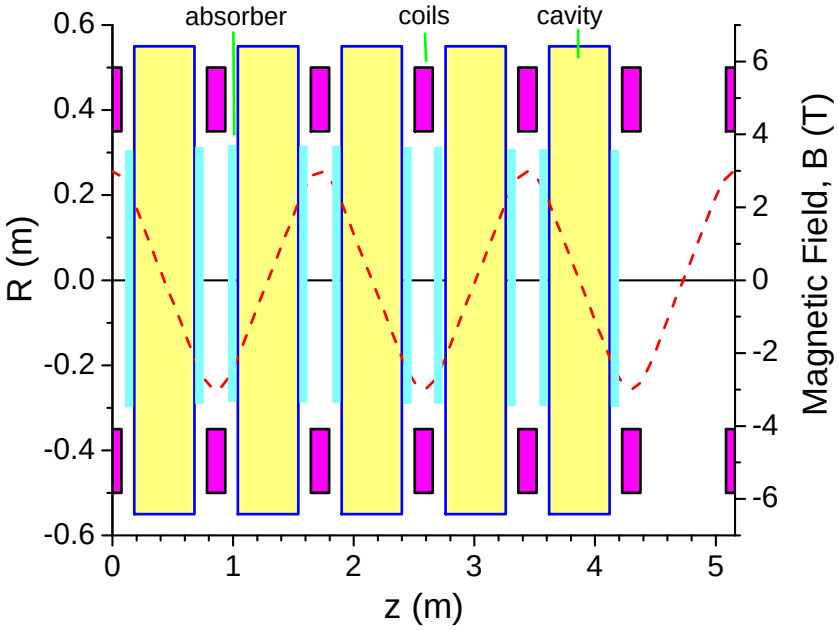
Muons

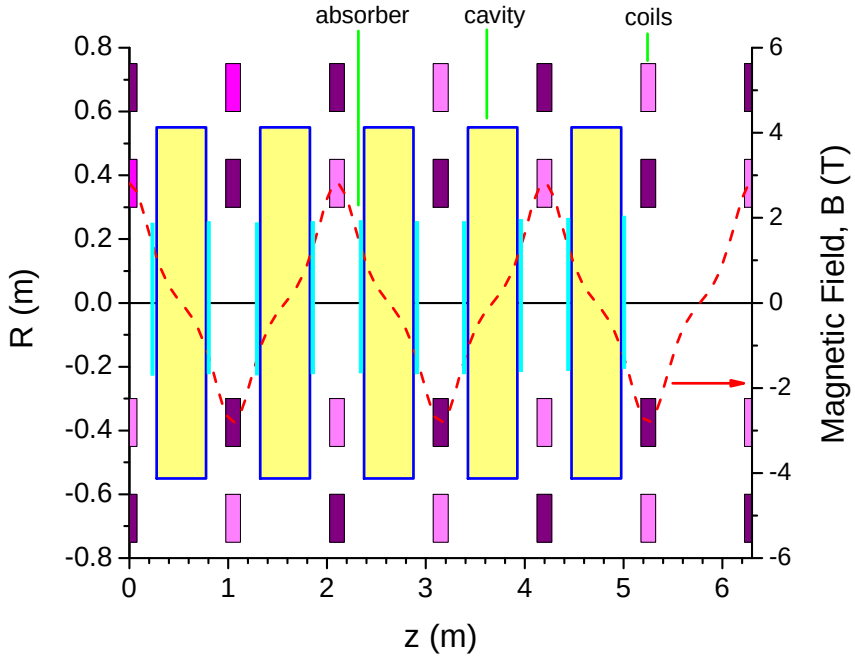


Protons



Front End

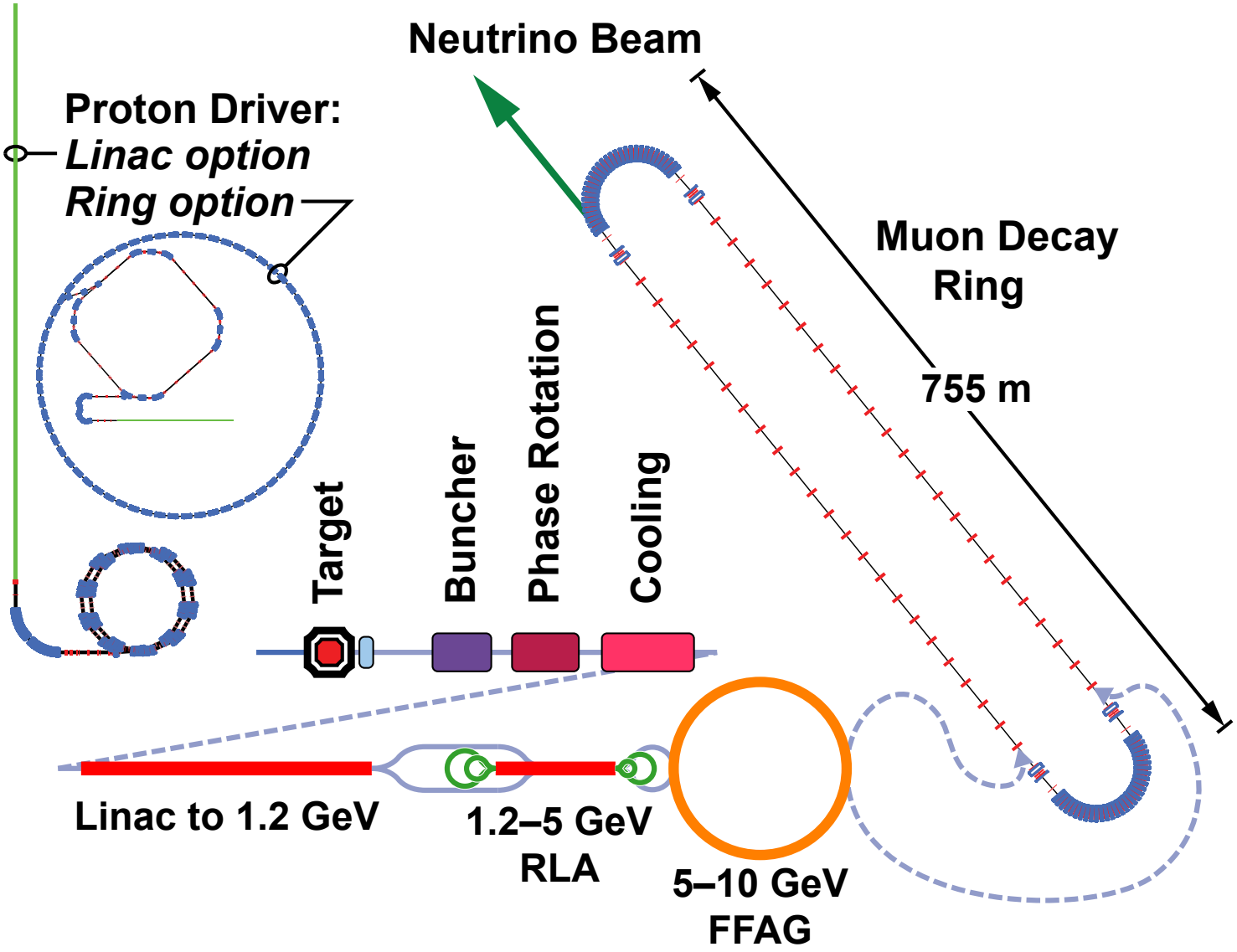

absorber
coils
cavity
R (m)
z (m)
Magnetic Field, B (T)
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
0
1
2
3
4
5
6
-6


absorber
cavity
coils
R (m)
z (m)
Magnetic Field, B (T)
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
0
1
2
3
4
5
6
-6

Acceleration

- New θ_{13} results, energy is now 10 GeV
- Old scenario
  - Linac to 0.9 GeV
  - RLAs to 3.6 and 12.6 GeV
  - FFAG to 25 GeV: gives cost advantage
- Choice between two scenarios
  - Linac → 0.8 → RLA → 2.8 → RLA → 10.0
  - Linac → 1.2 → RLA → 5.0 → FFAG → 10.0
- Chose the FFAG scenario at NuFact
  - Costs were similar
  - 5.0 GeV was a more useful breakpoint for physics than 2.8 GeV
    - Inconvient to make a similar breakpoint with the RLA-only

The Unofficial Decisive Baseline



Meeting Outline

- Staging discussed in plenary
- Front End
  - RF cavity test results
  - RDR baseline, with contributing simulation results
- Acceleration
  - New baseline
  - Linac, RLA, and FFAG design status
- Target snapshot for RDR
- Proton driver summary
  - Including transport line to target
- Decay ring: update to 10 GeV
- Engineering updates