

Accelerator Working Group Status and Plans

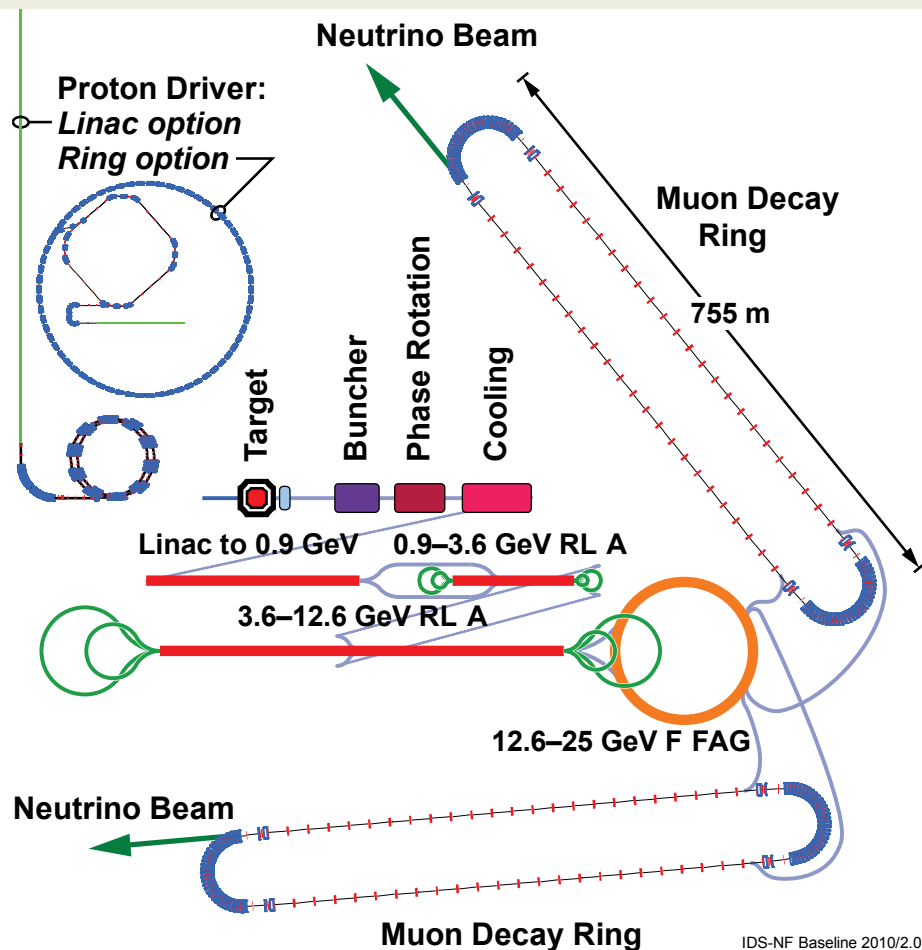
J. Scott Berg
Brookhaven National Laboratory
IDS-NF Plenary Meeting
17 October 2011

Outline

- IDR recap
- Major areas of progress
- New items to focus our attention on
- Costing
- RDR timeline and milestones
- Low energy neutrino factory

IDR Recap

- Proton driver: protons to target
- Target makes pions
- Front end manipulates muon phase space
- Linacs, RLAs, FFAG accelerate to 25 GeV
- Decay rings let muons decay to neutrinos



IDR Recap

- Accelerator lattice designs for full system
 - Missing some transfer lines
- Very little engineering, no costing
- Helped identify specific issues
 - Energy deposition in target region solenoids
 - Energy deposition in the front end
 - Linac/RLA design issues
 - Injection into decay ring
- Timeline with tasks to get to RDR

Progress

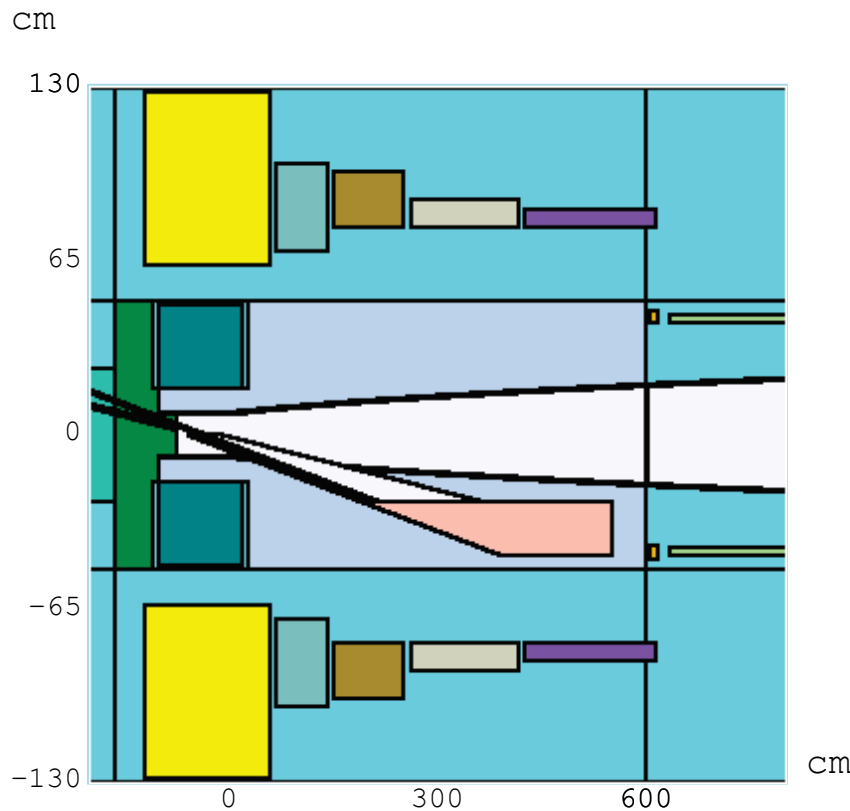
Target Solenoid Configuration

- Majority of proton beam energy deposited in target region
- Significant amount in SC solenoids
- Increased inner radius of nearest SC solenoid from 65 cm to 120 cm
- Power deposited in SC solenoids reduced from 50 kW to under 1 kW

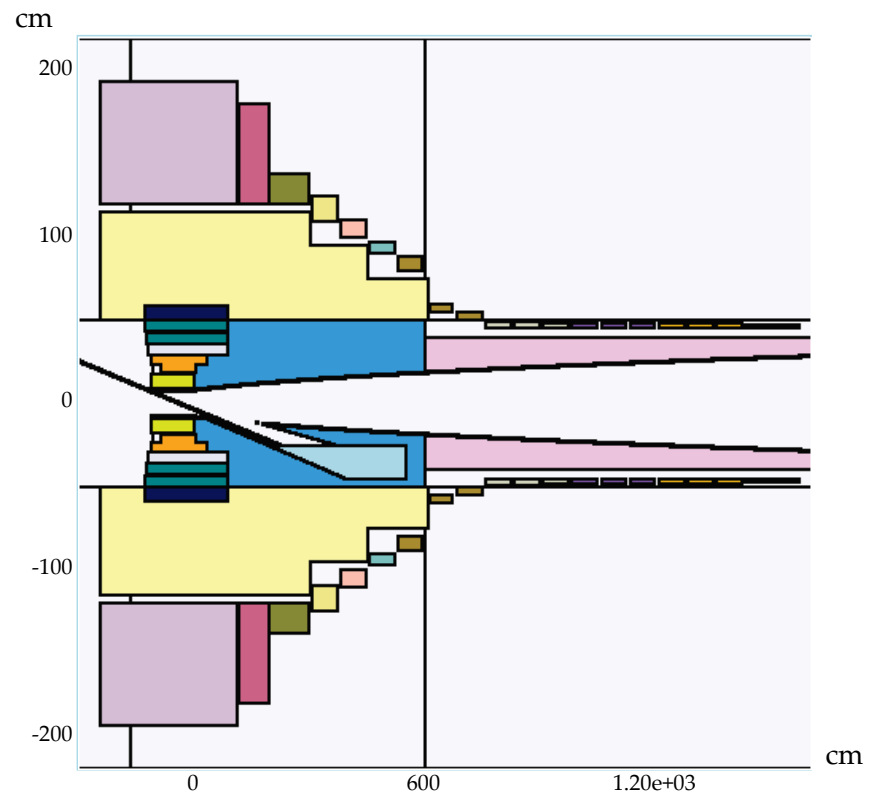
Progress Target Solenoid Configuration



At Time of IDR



Current



Progress

Energy Deposition in Front End

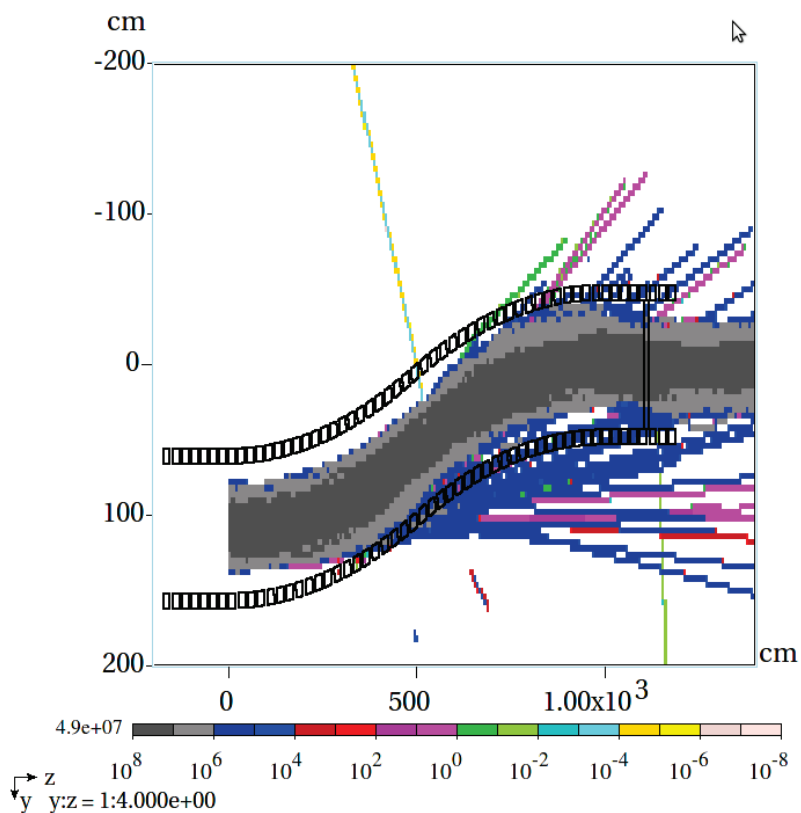
- Power deposited (100s W/m) by p, e, off-energy μ throughout front end
- Design of chicane to localize particle loss
 - Bent solenoid loses high-energy particles
 - Short absorber after chicane absorbs remaining p

Progress

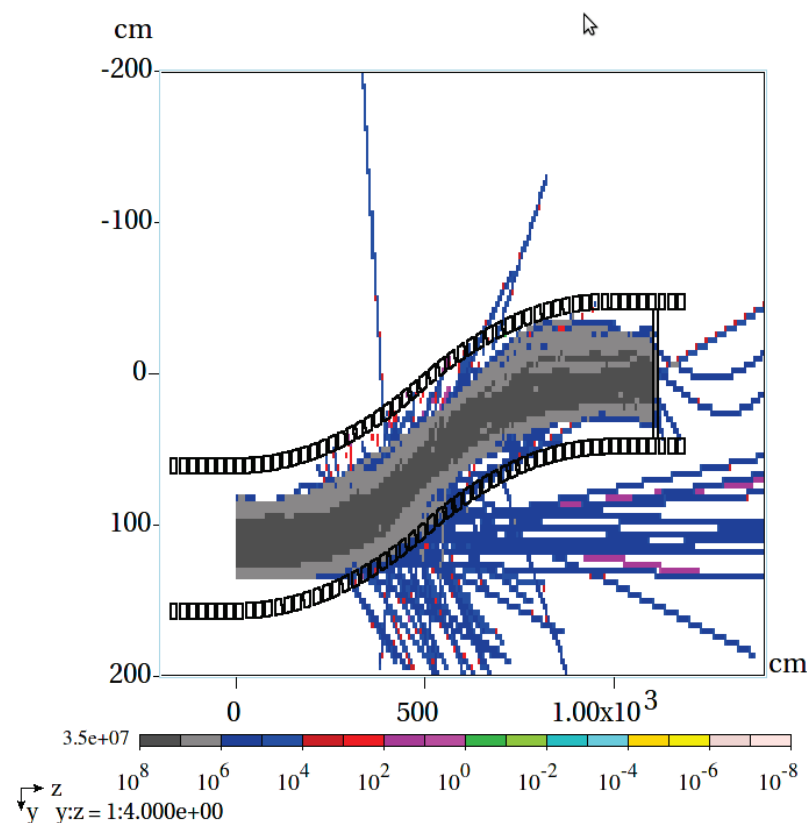
Energy Deposition in Front End



Muons



Protons



Progress

Linac and RLA Designs



- Review of IDR lattices identified some issues
- Met last April to review and propose a new lattice structure
- Updated designs for linac, first RLA
 - Includes 3-D layout
- Second RLA partly done

Areas to Focus our Attention

- Proton driver: feasibility of beam specs
- Final focus for proton beam near target
- Energy deposition from muon decays
 - Occurs everywhere
 - Important for engineering and costing
 - Especially bad in decay ring
 - Detector backgrounds also
- Injection into decay ring

Costing

- Steps in costing process
 - Accelerator lattices to engineering team
 - Engineers detail needs for a working facility
 - Feed back to the lattice designers
 - Work and components turn into costs
- Will hear talks from leaders of two parts of this process
 - Accelerator physics
 - Engineering team

Costing

- Goals of the discussion
 - Plan to keep information flowing to the right people
 - What we expect to accomplish
 - Needed resources (engineering!) and how we will get them
 - Timelines to get to RDR

RDR Timeline and Milestones

- Goals of accelerator section of RDR
 - Complete description of accelerator
 - Demonstration of feasibility and performance
 - Beam dynamics simulations
 - Sufficient design/engineering to demonstrate feasibility
 - Cost estimate of facility
 - Sufficient design/engineering to achieve this

RDR Timeline and Milestones

- All work for RDR done by end June 2013!
- Engineering must start long before that to have costs by that date
 - Engineering only to get cost and demonstrate feasibility: not necessarily build the facility
- Still some accelerator physics work to do
 - Engineering can start on many systems
 - Minor lattice modifications will not have major cost impact

RDR Timeline and Milestones

- Proton driver
 - Get 4 MW to final energy (mid 2012)
 - Bunch compression (late 2012)
- Target
 - Updated solenoid configuration (almost done)
 - Remaining infrastructure (jet delivery, beam dump, heat removal, remote handling, ...) (June 2012)
 - Significant specialized engineering needed

RDR Timeline and Milestones

- Front end
 - Define mechanism to handle energy deposition (Dec 2012, good progress)
- Linac and RLAs
 - Complete redesign (Feb 2012, Linac done)
- FFAG
 - Beam dynamics: settle longitudinal parameters (Dec 2011)
 - Transfer lines (Mar 2012)

RDR Timeline and Milestones

- Decay ring
 - Injection system (June 2012)
- Tracking through full system (June 2013, individual subsystems earlier)

Low Energy Neutrino Factory

- Physics may be pushing us to lower energies
- This would necessitate accelerator re-design
- Session in accelerator WG to discuss
 - Work needed if baseline moves to lower energy
 - What has been done to this point
 - How to plan for this, re-direct resources
 - Upgradability
 - Integration into RDR