Proton Driver

- Ion Linac Specification Report (1/7/14)
  - Complete 2/14/14; was posted for DOE review and removed
- Accumulator & Compressor Concept Specification Report (3/5/14)
  - No formal report written
  - Previous IPAC12 paper is nearly correct
    - Working out injection/stripping scheme
  - Report done in ~2 weeks

Front-End Status Report

Target, Capture Solenoid and Proton Dump (contributions from Kirk McDonald)

- The main goal is to develop a Target-System scenario for Phase 1 of MASS (6.75 GeV, 1 MW);
    - Retain an upgrade path to 4-MW, possibly with different beam energy and/or liquid-metal-jet target.
- A carbon target (graphite, radiation cooled in He-gas atmosphere) is the present baseline option at 1 MW.
    - A carbon target could be viable at 4 MW, if replaced ~ weekly.

Target R&D in FY14-16 is preconceptual, with little no "engineering" and no hardware testing.

- While various target systems are presently operational at ~ 1 MW beam power, all are for much longer beam pulses than for a Muon Collider/Neutrino Factory, $\Rightarrow$ Some extrapolation needed.
- The system closest to that being considered is the J2K target system, which has a graphite-rod target with convection cooling by He gas.
- A graphite target favors a small beam angle relative to the magnetic axis, $\Rightarrow$ unscattered protons enter the downstream Front End, to be swept out by the Chicane. It would be simplest to have no "dump" in the Target System, and use the Chicane as the beam dump.

Decay Channel, Chicane, Bucher & Phase-Rotator

- Integrate the short taper (~5m) decay channel into the FE
- Design a chicane & absorber system that will remove unwanted particles, for instance high energy protons.
- Optimize for performance: Chicane length, angle and aperture, absorber position and thickness, taper magnetic field, buncher & phase-rotator frequencies.
- Energy deposition on the coils

Cooling Accomplishments - 1

- Vacuum-RF Cooling team
  - 6D VCC simulation is complete
    - Achieved emittances below the MAP goal: 0.28 mm (transverse) and 1.5 mm (long.).
  - Designed two 6D channels:
    - One channel that uses both LiH and LH_2 absorbers
    - One that uses LiH only
  - Beam Matching (in progress)
  - Magnet feasibility studies for the last stage ongoing (BNL-LBNL Collaboration). Looking for a combo of NbTi and Nb3Sn coils
  - Carried out a theoretical estimate of the needed rf window thickness. Calculation to be checked with advanced simulation codes (BNL-LBNL Collaboration)
  - RF Engineering support: Still questions remain regarding the achievable RF gradient, thickness of waveguide, required distance between magnets and cavities.

Cooling Accomplishments - 2

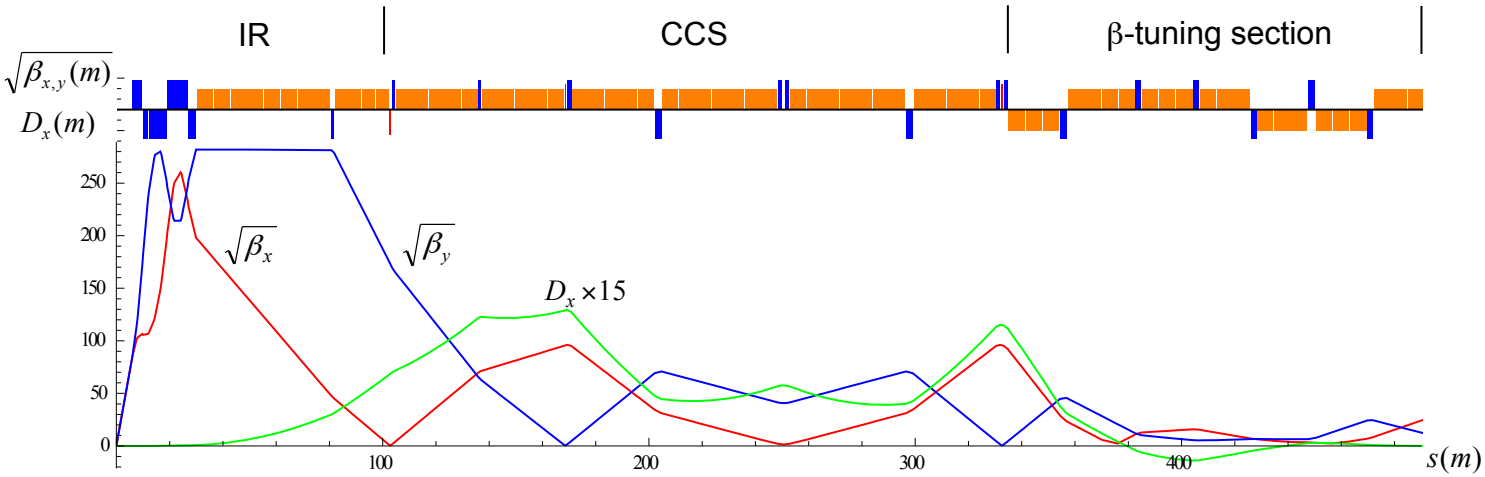
- HPRF Cooling team
  - 3-day HCC simulation school (7 classes, 12 attendees)
  - focus on the initial cooling section including with the matching
  - updating the bunch merge channel (325 MHz)
    - including acceleration to bunch merging energy and deceleration to the single bunch HCC
    - New post doc Amy Sy
  - For the gas-plasma simulation effort, we propose to use WARP on NERSC to involve the ionization process.
  - We have developed a hand-made simulation code (SPACE) to study complicated plasma chemistry.

Acceleration Status

- NuMAX linac
  - Identified bunch train incompatibility for 650 MHz section. Working on chicane design to resolve this.
  - Initial 325 MHz linac designed
  - Need phasing and solendoid-to-FODO match in 650
  - Discussed solution accelerating initially with warm RF (avoid cooling, better neutrino factory flux), but no plans to design
  - Slip to end April
- RLA to 63 GeV
  - Investigating 3-pass 650 MHz vs. 9-pass 325 MHz
  - Slip to end May, due to additional work on NuMAX linac
- Synchrotrons to higher energy
  - Outline for compact cell in place (2π achromat plus short linac with tunable straight): needed due to rapid acceleration
  - Next step is getting high-level parameters

Progress with the collider lattice design (WBS 02 05)

- Design of the 3TeV collider lattice is on track (lattice file is due 7/28/14)



Preliminary version of the 3TeV collider lattice with quadruplet Final Focus.
$\beta_y^{(max)}$ is reduced to 80km compared to 118km in the previous design with triplet FF.
Matching to the arc has not been done yet.

- Lattices of the Higgs Factory and 1.5TeV collider are ready for submission

MAP MDI: Higgs Factory – March 31, 2014

- Based on massive MARS optimization simulations, the Higgs Factory MDI and magnet protection configurations are frozen.
- Intermediate source term files at the MDI surface have been generated and provided to detector folks; with their feedback, some modifications are envisioned before the general release for a full bunch crossing; work on HF ILCRoot nozzle and detector models are underway; parallel modeling of detector response within the MARS framework is under discussion.
- The plan is to wrap up the Higgs Factory MDI studies by May 1, 2014, and then switch to 3-TeV Muon Collider work.

IBS Process – Decay Rings

- Adapting 10 GeV IDS-NF Decay Ring to 5 GeV NuMAX ring:
  - Defined new muon bunch time structure - operation with just **one** bunch train of each muon species in the ring (March 2014)
  - Smaller transverse ring acceptance: 20 mm rad (March 2014)
  - First-cut lattices from D. Kelliher (due July 2014):
    - Scaling down lattices in momentum
    - Shortening cells to accommodate new injection scenario
    - Define new technological specifications for kickers and septa
- Large acceptance ($\Delta p/p = \pm 16\%$) ring design for nuSTORM
  - Pursue both FODO and FFAG Racetrack designs (lattices due July 2014 - A. Liu and J-B. Lagrange)
    - Continue lattice optimization and Dynamic Aperture study for both designs