

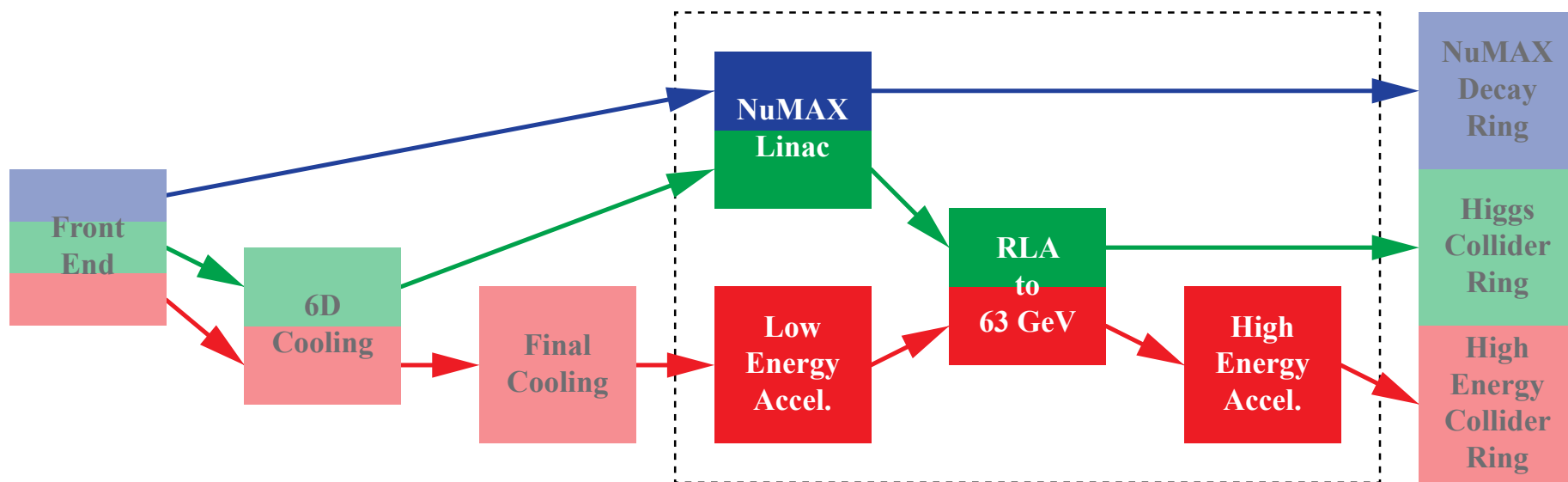
Acceleration Summary

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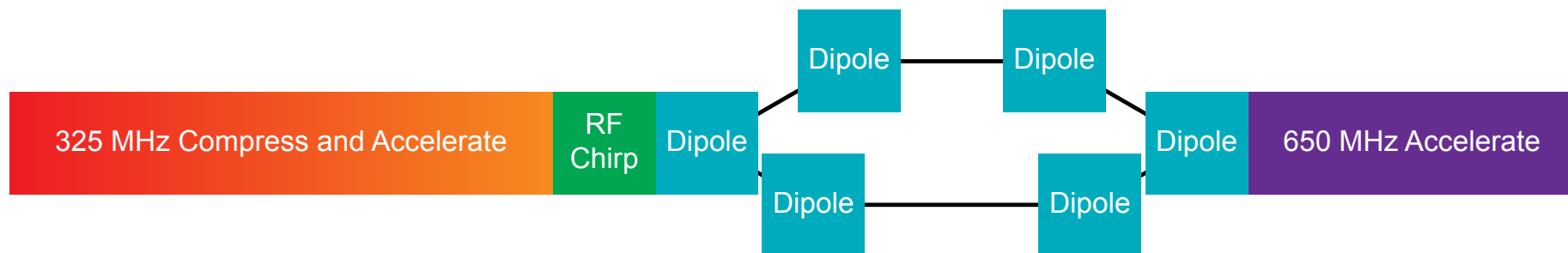
MAP 2014 Spring Meeting

31 May 2014



- Three classes of machines
 - NuMAX: neutrino factory to 5 GeV
 - Higgs factory: 63 GeV collider
 - High energy colliders: 1.5, 3, ≈ 6 TeV, and higher CoM
- Four acceleration subsystems
 - Linacs for NuMAX
 - RLA to reach 63 GeV
 - Low energy acceleration for colliders
 - High energy acceleration beyond 63 GeV: pulsed synchrotrons
- Some acceleration subsystems can be reused for different machines

- 325 MHz linac (255 MeV/c–1.25 GeV) FOFO (63°)
 - Short cells (2.5 m cryo: sol + 2-cell cavity): 22 cells
 - Medium cells (3.5 m cryo: sol. + 4-cell cavity): 30 cells
- Chicane (16 meter)
- 650 MHz linac (1.25 GeV–2.5 GeV) FOFO (63°)
 - Long cells (4 m cryo: sol + 2×4-cell cavity): 24 cells
- 650 MHz Linac (2.5 GeV–5 GeV) FODO (90°)
 - Very long cells (6 m cryo: quad + 2×4-cell cavity + quad + 2×4-cell cavity): 24 cells



- 650 MHz linac shared by muons and H^- , designed for muons
- Compatibility with H^- beam
 - H^- stripping
 - No problems expected for Lorentz stripping
 - Intra beam scattering needs to be checked
 - Chicane dipole may be a problem (will be checked), could be pulsed
 - Solenoid to quadrupole match may blow up H^- emittance
 - H^- and muon beam have different momenta
 - Match needs to be designed and checked
 - No serious concerns with RF power compatibility

- Limits passes in RLAs
- Top off in synchrotrons
- Some concern about numbers

f_{RF} MHz	Gradient MV/m	Passes	Charge 10^{12}	$\Delta U / U$ %
325	20	9	4	29
650	25	1	2	5
650	25	1	4	10
650	25	3	4	31
1300	35	1	2	15

- Work at Cornell
- 500 MHz explosion bonded cavities fabricated (spun)
 - Problems with Nb cracking at iris
- Future proposed program
 - Make explosion-bonded 1.3 GHz, using lessons learned from 500 MHz
 - Try electroplating Cu on Nb
 - Look into solid Nb cavities at lower frequencies

- Two pulsed dipole designs discussed
- Important difference: SC excitation coils vs. warm
 - SC coil motivation
 - Higher current density, smaller yoke
 - Significant reduction in coil eddy current losses
 - Determining whether advantages overcome additional losses associated with cryogenic coils
 - Some computational discrepancies need to be sorted out
 - Some homework assignments here, made some progress
- Report of pulsed dipole work at U Mississippi

NuMAX linac	325 MHz done. 650 MHz needs matches and phasing. Chicane parameters to be finalized. H ⁻ stripping and solenoid to quad match for H ⁻ to be checked.
RLA to 63 GeV	Next: choose 325 or 650 MHz based on longitudinal dynamics
Pulsed synchrotron	Lattice cell described. Next: choosing lattice parameters
Low energy	Awaiting final cooling

- NuMAX linac design
 - Finalize muon design
 - Verification of H⁻ compatibility
- Pulsed synchrotron design
- RLA to 63 GeV
- Minor corrections to IDS-NF RLA

Complete for July

Complete by end of FY14