A Brief Introduction to the Muon Accelerator Concepts

Muon Collider – Preparatory Meeting, April 10-11, 2019

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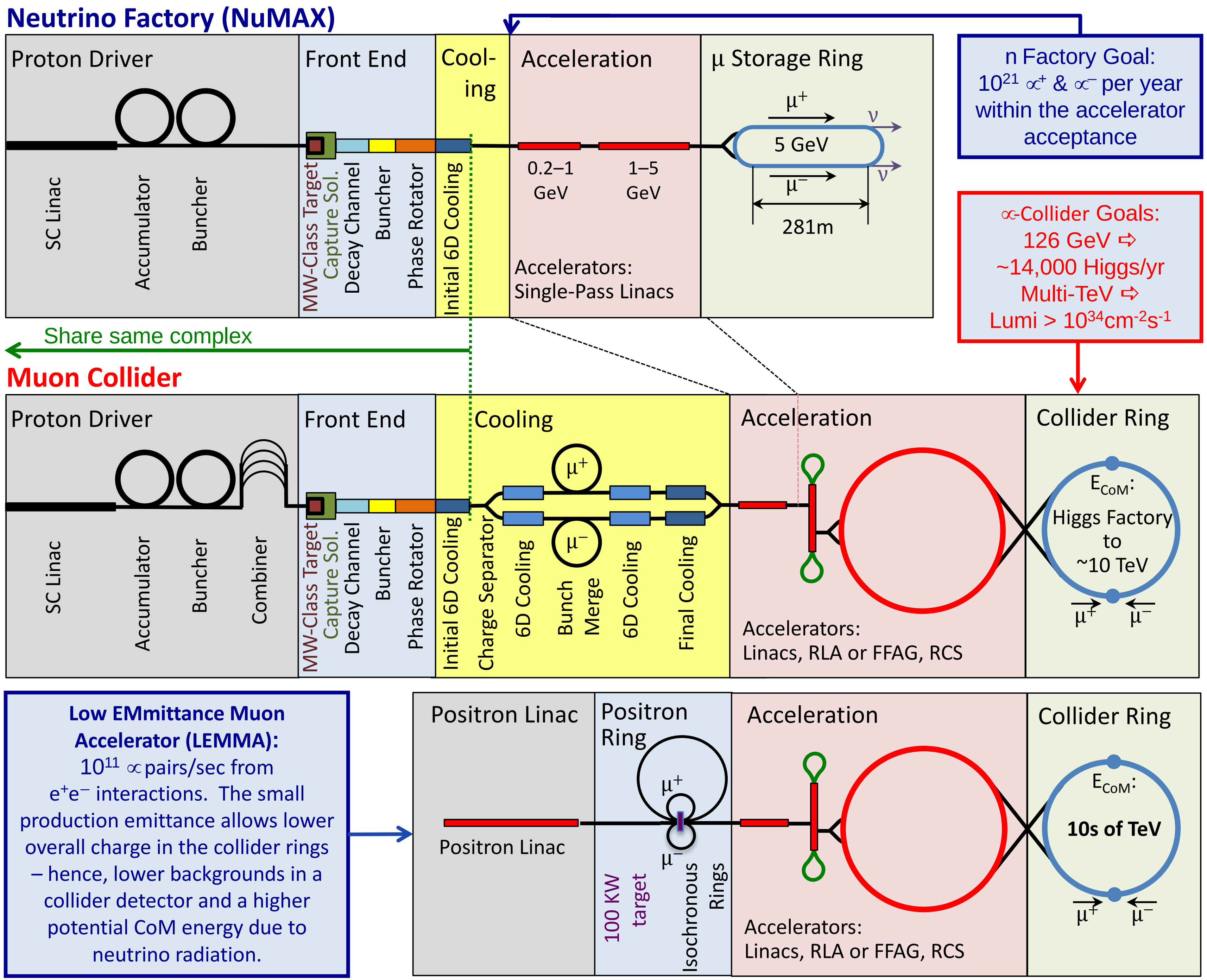

Broad Applications:

- Neutrino Factories
- Colliders from ~100 GeV to 10s of TeV scale
- Secondary Beams

Potential Sources:

- Proton-driver with ionization cooling
- Positron-driver with low emittance

Muon Accelerator Design Status

- Full conceptual designs for NFs
- Collider effort (US) focused on key R&D elements as opposed to a full conceptual design
  - In 2012, justified by the facts that
    - Proposed parameters for some systems appeared extremely challenging
    - Some concepts could not be “easily” demonstrated
- R&D and design progress since 2012 arguably changes this picture

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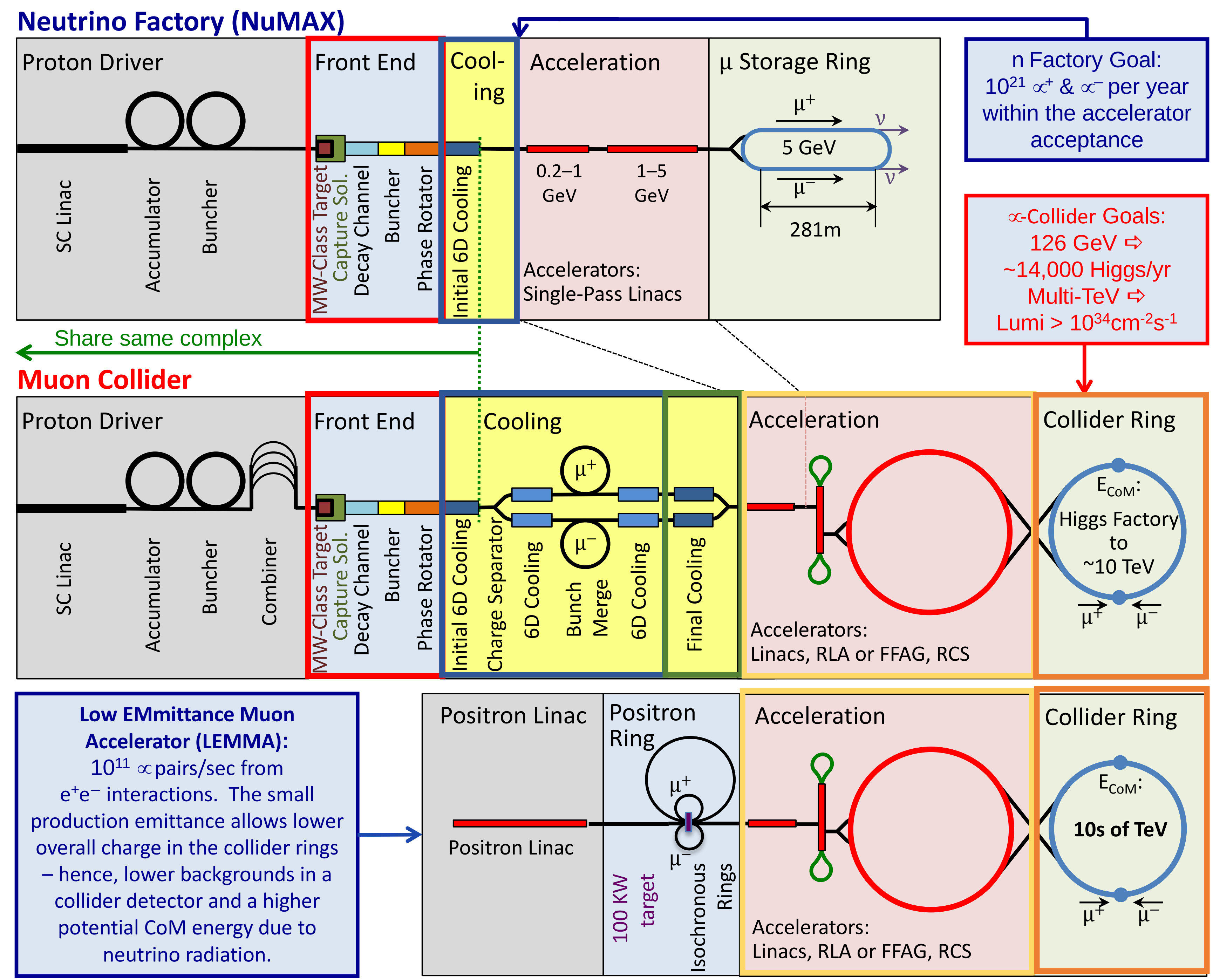

Magnet Topics:

- Large-diameter, high-field capture solenoid
  - Very high radiation environment
  - Must support remote handling for target module
- Front End
  - Superconducting transport solenoids
- 6D Cooling Channel
  - RF in SC Solenoids
  - LTS-only in MAP baseline
  - Performance improvements with higher RF gradient
  - Can final-stage performance be improved with HTS?
- Final cooling very high field solenoids
  - ~30T HTS with >25 mm bore
  - Field and aperture demonstrated at NHMFL
- Accelerators
  - Fast-ramping SC (or NC) magnets
  - SC Halbach Designs
- Collider
  - Large aperture with significant shielding
  - IR Strengths for high energies