Muon Acceleration – ‘Dogbone’ RLA and Beyond

- Fixed field multi-pass (5) RLA based on SRF linac suitable for multi-ten GeV acceleration of fast decaying muons
  - Simultaneous acceleration of both $\mu^+$ and $\mu^-$ charge species
  - ‘Dogbone’ topology offering high efficiency of RF usage (close to factor of 2 higher than a corresponding racetrack)
  - “Bisected” linac optics allowing for acceleration in both directions: the quadrupole gradients are scaled up with momentum for the first half of the linac, then they are mirror reflected in the second half.
  - Compact nested droplet arcs, since no sizable synchrotron radiation

- RLA with FFAG-like arcs:
  - Transporting two or more discrete energies through the same beamline
  - Proof-of-principle solution – Two 2-pass arcs matched to the linac – **JEMMRLA** (JLab Electron Model of Muon RLA)

- Rapid Cycling Synchrotrons
  - Good hardware and power efficiency
  - Strong synchrotron oscillations
  - Proof-of-principle demonstration of the fast ramped magnet needed

Higgs Factory: 5-pass RLA 5-63 GeV

- **51.4 GeV**
- **28.2 GeV**
- **5 GeV**
- **11.6 GeV/pass**
- **63 GeV**
- **16.6 GeV**
- **39.8 GeV**
Staging Approach to Future Muon Facilities

- Muon Collider
- Neutrino Factory (LBNE)
- Higgs Factory
- Linac + RLA to 5 GeV
- NF Decay Ring
- Project X Stage III
- Project X Stage II
- Project X Stage I
- Fermilab

ν to Homestake

Muon Accelerator Staging Studies
MAP Circa 2015