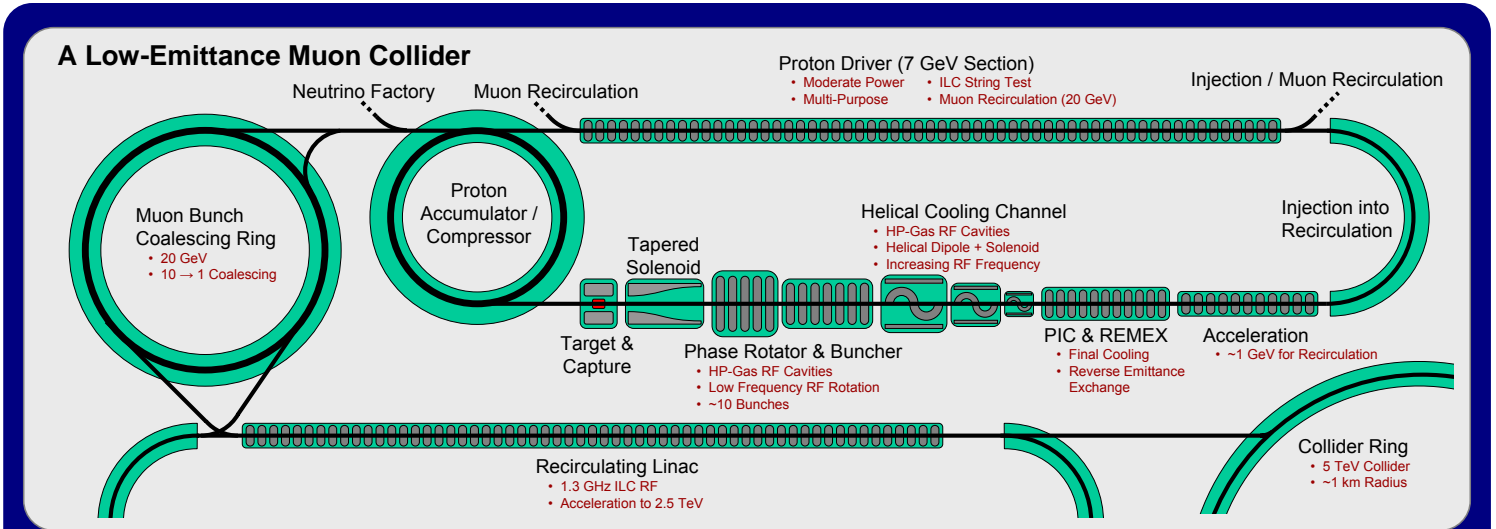


Summary of the Low-Emittance Muon Collider Workshop (6-10 February 2006)

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The LEMC Workshop

In February 2006, Muons, Inc., and Fermilab sponsored a workshop to evaluate the feasibility and consequences of a muon collider with emittances much lower than previously envisioned. The workshop was held at Fermilab over the week of 6 – 10 February 2006. It was attended by 65 people representing 16 institutions from around the world.

Benefits of Low Emittance

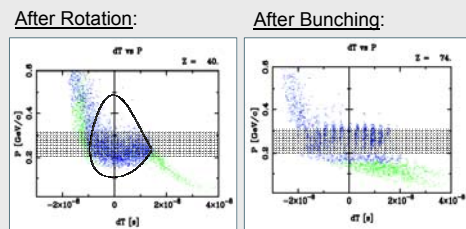
- Low Emittance Muons Beams decrease the required muon current for a given luminosity
- Decreased muon current reduces neutrino radiation problems, intensity of muon-decay electrons (in RF and in the detector), required proton beam power on the target, beam loading and space-charge effects
- Low emittance beams are easier to transport
- Low emittance beams allow for higher frequency RF acceleration
- Allows for stronger focusing at the interaction point (limited by beam extension into the low-beta quadrupoles)

The Challenge

Energy:	5 TeV (2×2.5 TeV)
Luminosity:	10^{35} cm⁻² s⁻¹
Normalized Transverse Emittance (ϵ_{TN}):	~2 mm mrad
Interaction Focus (β^*):	5 mm
Muons / Bunch:	10^{11} (~10 bunches)
Beam-Beam Tune Shift Limit:	~0.1

New! Phase Rotation & Bunching

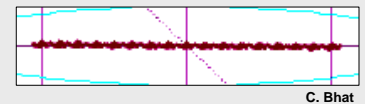
Fast phase-energy rotation is required to better match the muon beam into the cooling channel. New schemes



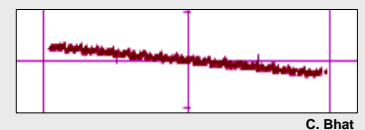
New! Muon Bunch Coalescing

Previous muon collider designs considered single muon bunches from generation to collider ring. However, single, low-emittance bunches present a problem at low energies. Thus, new designs consider generating multiple muon bunches and coalescing them in a special coalescing ring.

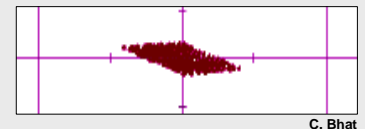
Bunch Train after Pre-Acceleration:



Bunch Train after Vernier Linac:



Bunch Train after Coalescing:



Thanks to Fermilab for providing space and facilities for the workshop.

Thanks to everyone who participated. A list of participants and their contributions can be seen at the workshop website:

<http://www.muonsinc.com/mcwfeb06>