Abstract Submitted
for the SES15 Meeting of
The American Physical Society

Quadrupole Doublet Channel and Septa Emittance Exchange for Muon Collider Final Cooling JOHN ACOSTA, DONALD SUMMERS, TERRENCE HART, LUCIEN CREMALDI, SANDRA OLIVEROS, University Of Mississippi - Oxford, DAVID NEUFFER, Fermilab — The Muon Collider requires a low emittance $\epsilon_{6D} = 0.044mm^3$ muon beam to get a luminosity of $\mathcal{L} \simeq \infty\prime^{\ni\triangle}\rfloor\Updownarrow^{-\in}\int^{-\infty}$ to produce enough rare events. The muons are generated from pion decays that produce a muon beam with a very high emittance. To reduce the emittance two ionization cooling channels have been simulated that reduce the 6D normalized emittance to as low as $\epsilon_{6D} = 0.123mm^3$, almost a factor of a million. However, the 6D emittance required by a muon collider is $\epsilon_{6D} = 0.044mm^3$. We propose a final cooling channel composed of quadrupole doublets limited to 14 Tesla that provide strong focusing. The low β^* regions, as low as 5 mm, are occupied by dense, low Z absorbers that cool the beam. Quadrupole channel emittances are based on calculations rather than full simulations at this point. After final cooling, normalized xyz emittances of (0.071, 0.141, 2.4) mm-rad are exchanged into (0.025, 0.025, 70) mm-rad as required by a collider. The beam is divided by 16 electrostatic septa into 17 channels.After that, a series of RF deflector cavities, as used in CLIC tests, form a 3.7 m long bunch train. Snap bunch coalescence combines the 17 bunches into one in a 21 GeV ring in 55 microseconds.

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Date submitted: 16 Oct 2015

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