New Runs in G4Beamline

Pavel Snopok
University of California Riverside

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Action list

- Find data files containing both μ^+ and μ^-.
- Find μ/p yield.
- Plot emittance graphs, compare to ICOOL.
- Use larger statistics.

Data file

- Thanks to Harold Kirk I am now using a new initial distribution file containing both positive and negative particles.
- The file header goes "All particles from MARS input of 1e5 protons, 8 GeV on Hg, with 2 ns rms gaussian bunch length".
- The following table summarizes the particle content of the beam:

Particle	Count
$p/\bar{p}$	52460/405
e^-/e^+	9790/9798
π^-/π^+	17909/16933
μ^-/μ^+	2357/2325
K^-/K^+	66/851
Total:	112894

Simulation setup

- I use π^-/π^+ (34842), μ^-/μ^+ (4682) and K^-/K^+ (917) for my simulations.
- Total number of protons on target: 100000 (1e5).
- Below is a table summarizing particle yield after different stages in a typical run (decay and stochastics are on).

| Stage	μ^-/μ^+	Total	μ^+/p	μ^-/p	μ/p
After Drift	13289/12767	26056	0.133	0.128	0.261
After Rotator	13687/13155	26842	0.137	0.132	0.268
After Cooler	7698/7184	14882	0.077	0.072	0.149
After Cooler (t>950 ns)	5075/4611	9686	0.051	0.046	0.097
After Cooler (p>100 & p<400)	5840/5334	11174	0.058	0.053	0.112

Muon bunches after cooler
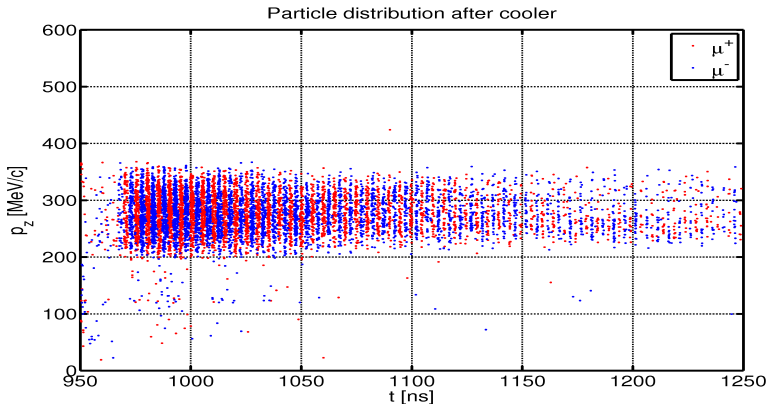
Particle distribution after cooler, baseline frontend lattice,
cooler max. gradient = 16 MV/m

ecalc9 settings

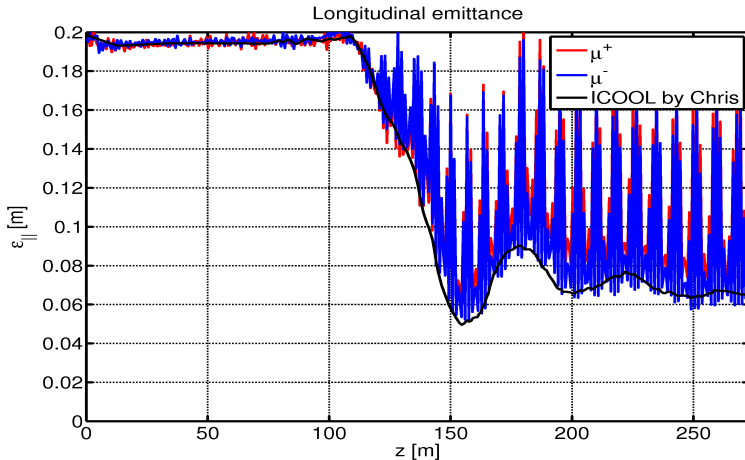I use the following ecalc9 settings (same as Chris used in ICOOL):

- Particle type: 2 (μ^+) or -2 (μ^-)
- $p_{z_{min}}/p_{z_{max}}$: 0.1/0.3 GeV/c
- transverse cuts: 0.015/0.03 m
- longitudinal cut: 0.15 m
- RF frequency: 201.25 MHz
- sigma cut: 0
- do not subtract out amplitude correlation

Transverse emittance compared to ICOOL
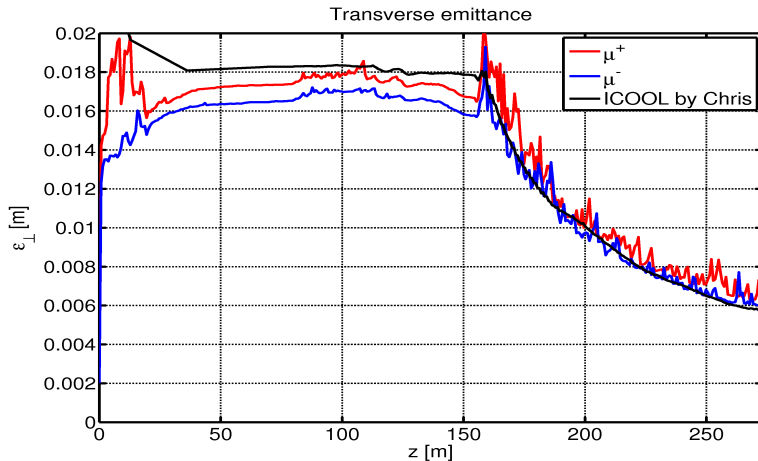
Longitudinal emittance compared to ICOOL

6D emittance compared to ICOOL