



6D cooling channel simulation status

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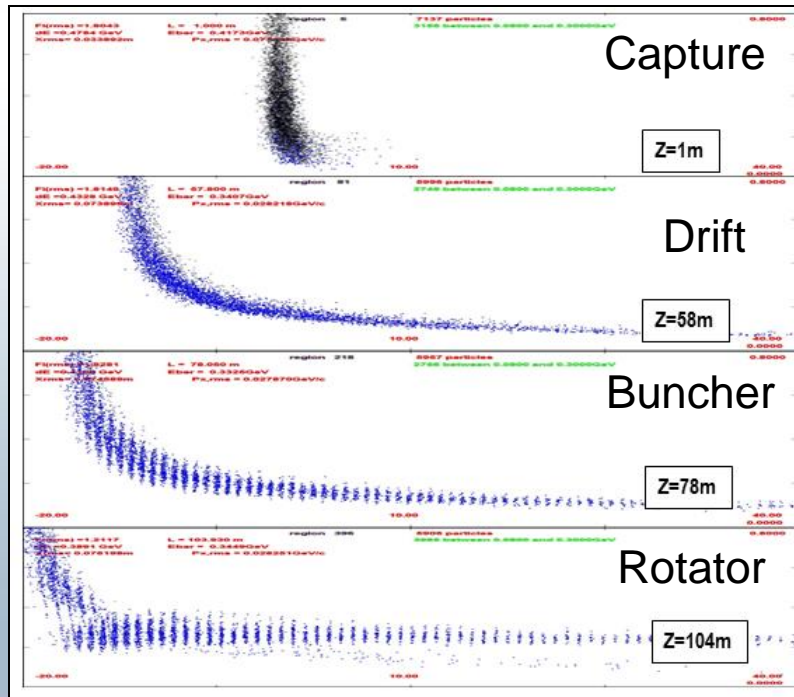
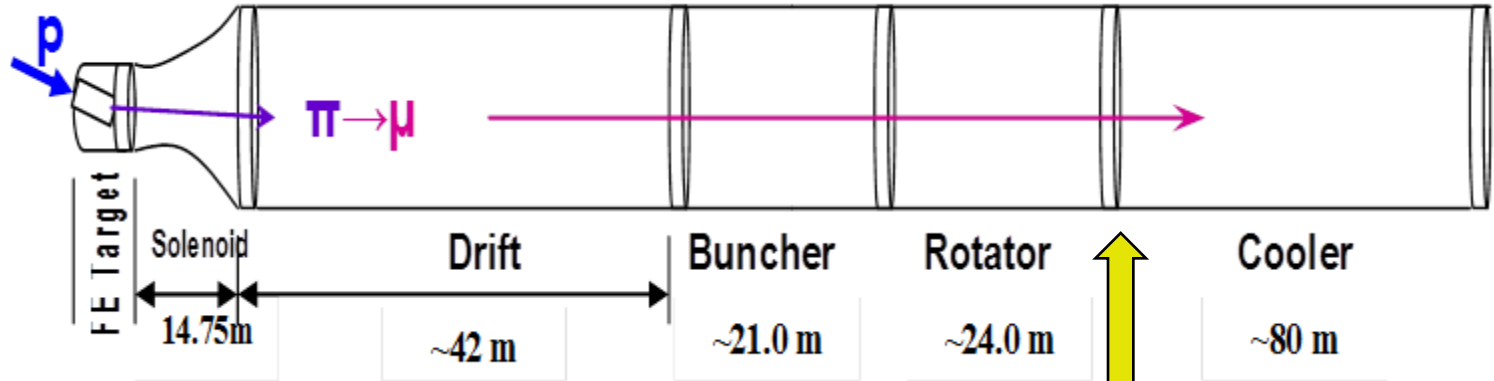
Vacuum RF Phone Meeting

December 10, 2013

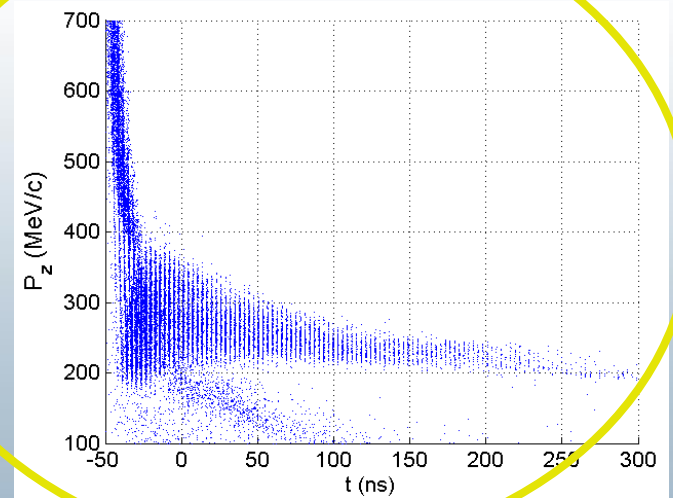
Status of 6D Cooler

- Output from 325 MHz phase-rotator
- Designed & simulated 6D rectilinear cooling channel BEFORE the merge
- Preliminary design of a bunch-merger that takes the output from the previous channel
- Designed & simulated a rectilinear cooling channel AFTER the merge.
- Conclusion: While many gaps remain, we have for the first time a draft of a complete 6D channel

MC 325 MHz Front-End



Begin 6D Cool



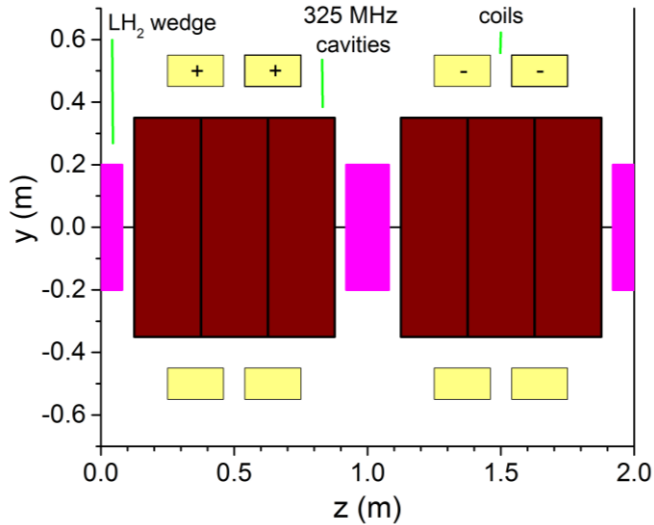
Overview (Pre-Merge)

Parameters	f (MHz)	V (MV/m)	Abs	B axis / coil	Length(m)
Stage 1	325	22	LH ₂	2.3/4.2	132.0
Stage 2	325	22	LH ₂	3.5/8.4	171.6
Stage 3	650	28	LH ₂	4.8/9.5	107.0
Stage 4	650	30	LH ₂	6.0/11.8	54.4

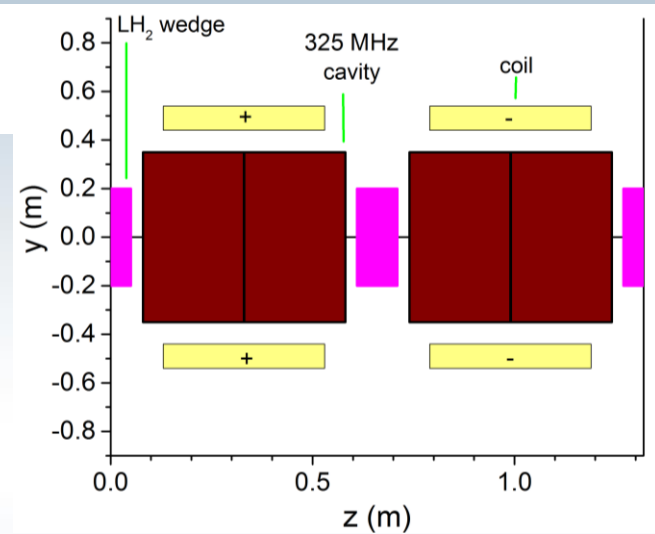
- Total transmission is 55% with decays
- Total length is 465 m.
- Cools down to 1.4 mm (P), 2.5 mm (L)
- Supply output to Bao and Bob Palmer for bunch merging (next talk).

4-Stage System

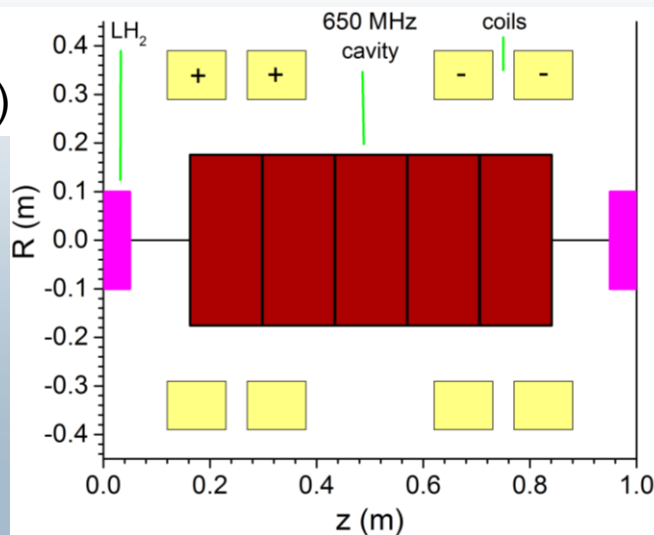
Stage 01
(66 cells)



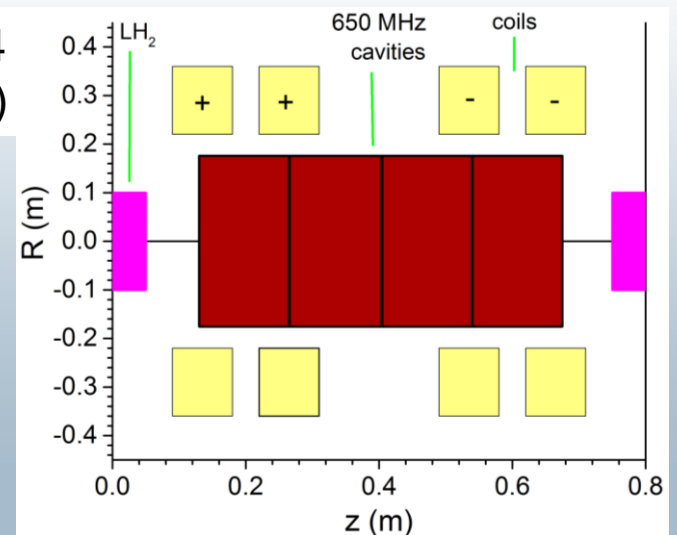
Stage 02
(130 cells)



Stage 03
(107 cells)



Stage 04
(68 cells)

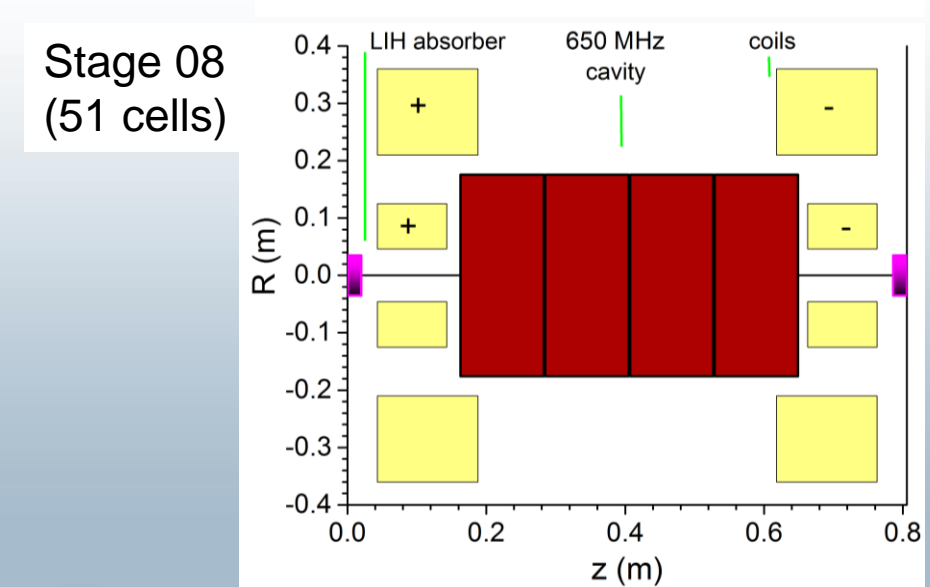
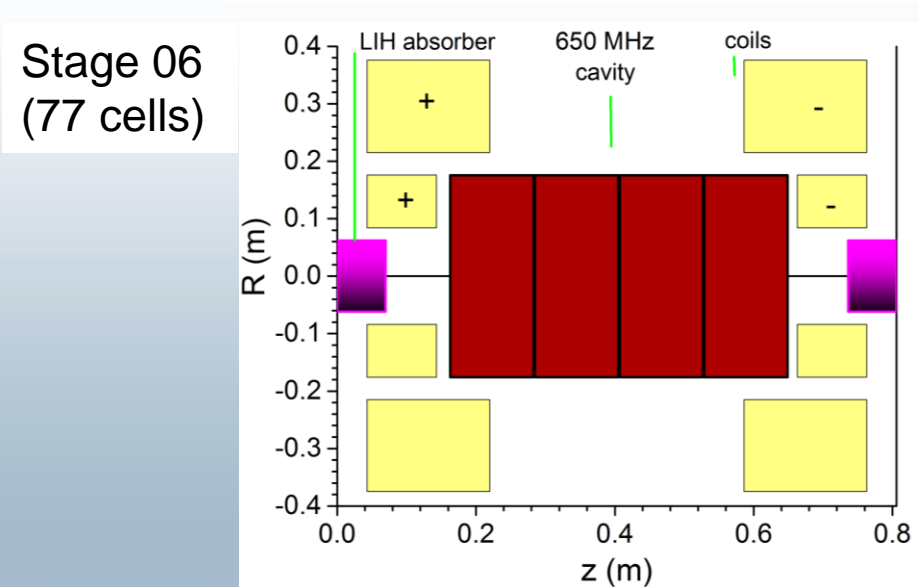
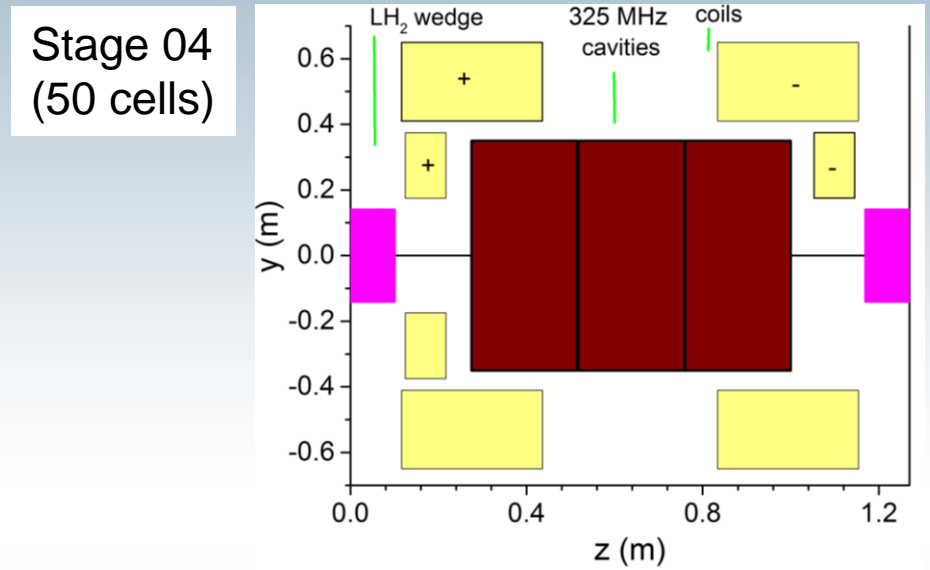
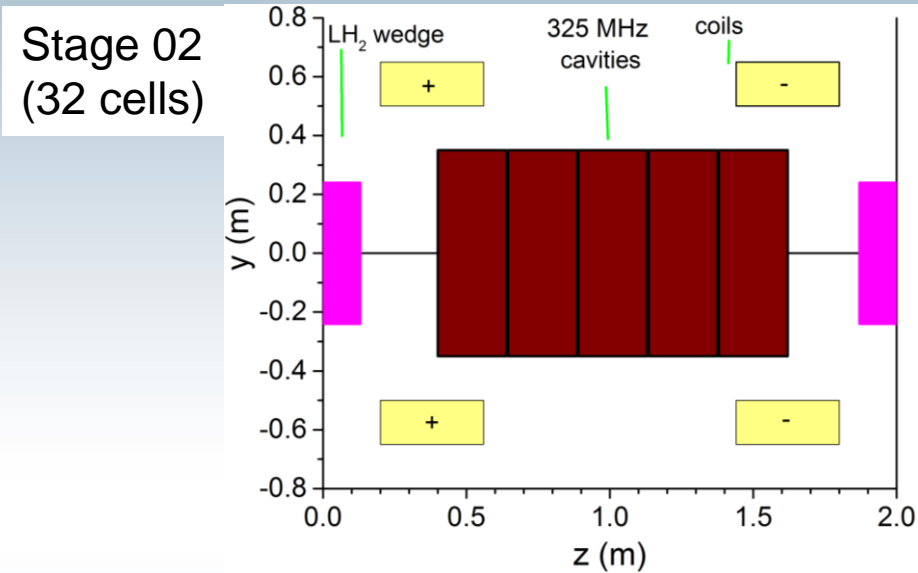


Overview (Post-Merge)

Parameters	f (MHz)	V (MV/m)	Abs	B axis / coil	Length
Stage 1	325	19.0	LH ₂	2.6/6.8	55.0
Stage 2	325	19.5	LH ₂	3.7/8.4	64.0
Stage 3	325	21	LH ₂	4.9/12.2	81.0
Stage 4	325	22	LH ₂	6.0/9.2	63.5
Stage 5	650	27.0	LiH	9.8/14.1	73.3
Stage 6	650	28.5	LiH	10.8/14.1	62.0
Stage 7	650	26.0	LiH	12.5/14.2	40.3
Stage 8	650	26	LiH	12.9/14.5	41.1

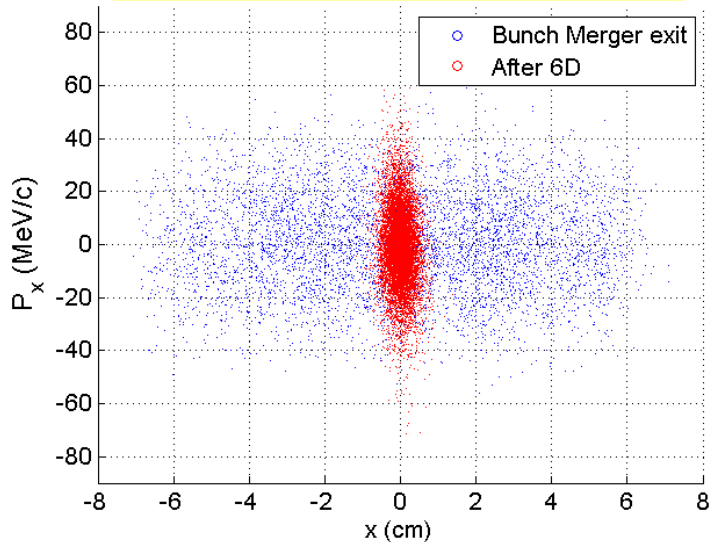
- Total transmission is 40% with decays
- Total length is 480 m.
- Cools down to 0.32 mm (P), 1.6 mm (L)

Lattice Visualization

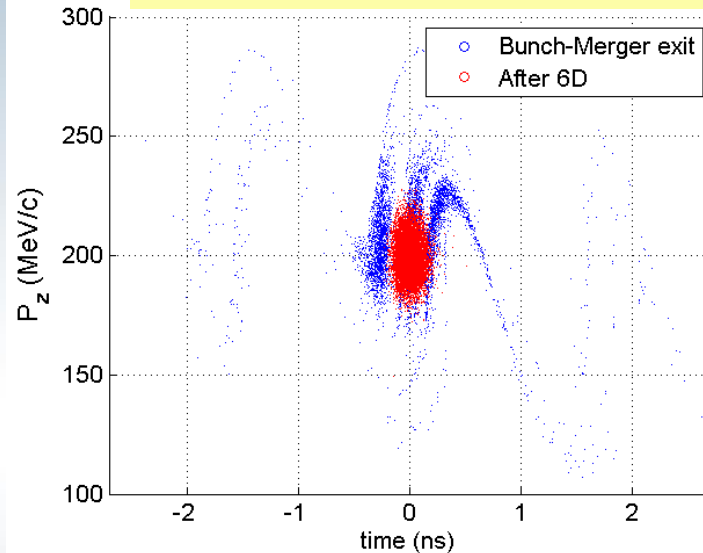


Beam before & after Cooling

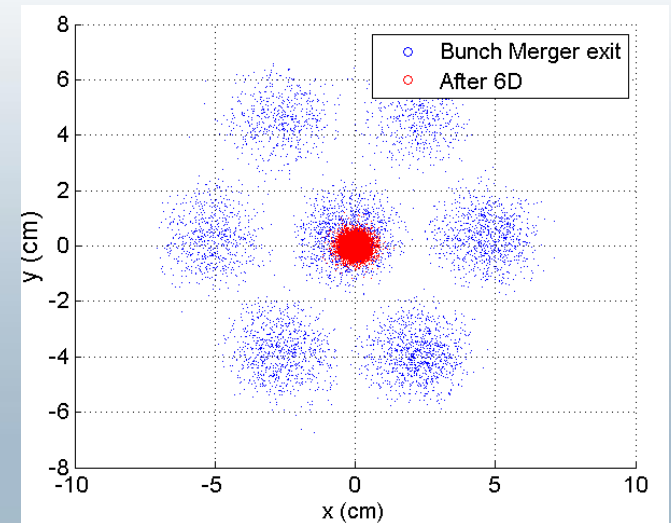
Transverse phase-space



Longitudinal phase-space



- Ave. mom. before: 208 MeV/c
- Ave. mom. after 6D: 199 MeV/c



Future work (mostly blank for discussion)

- Be windows on rf cavities (Scott)
- Engineering study
- Other suggestions...