



# 6D cooling channel simulation status

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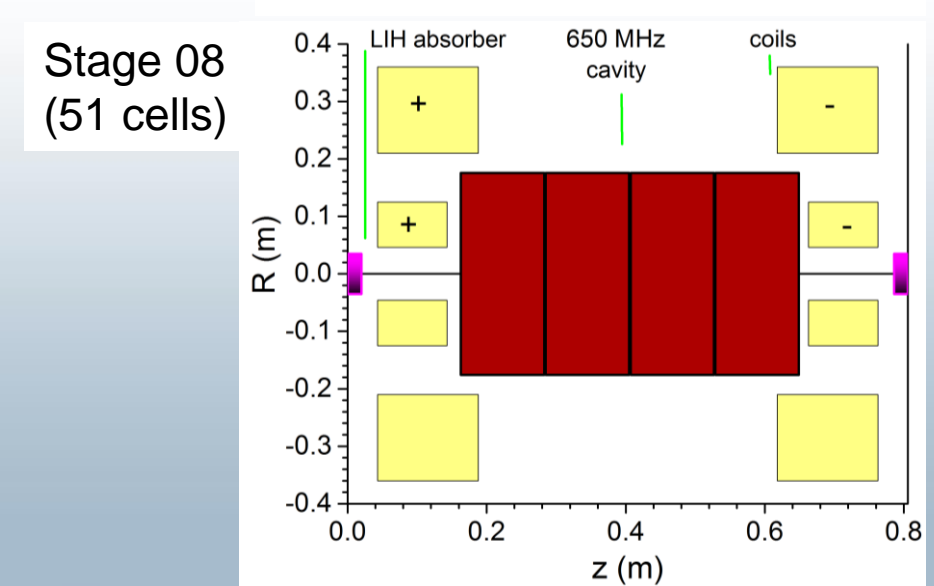
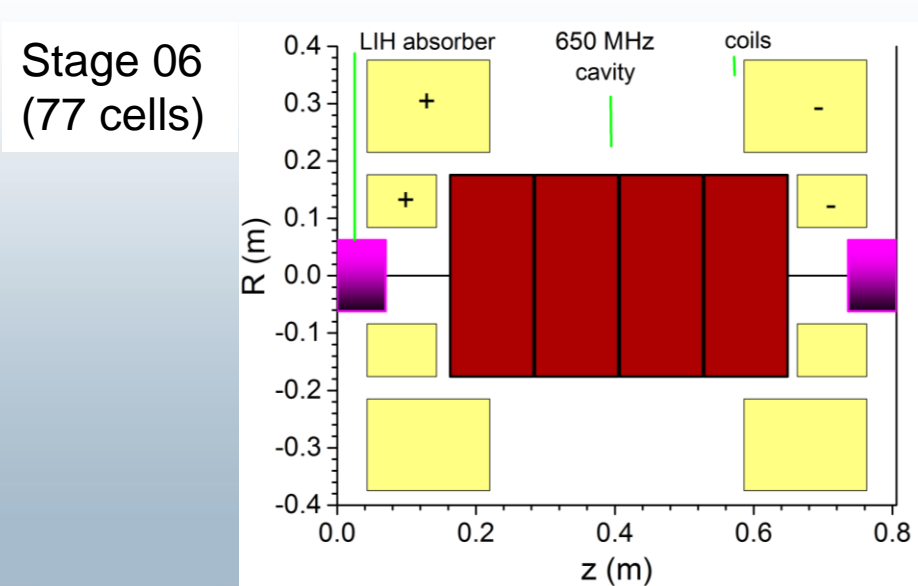
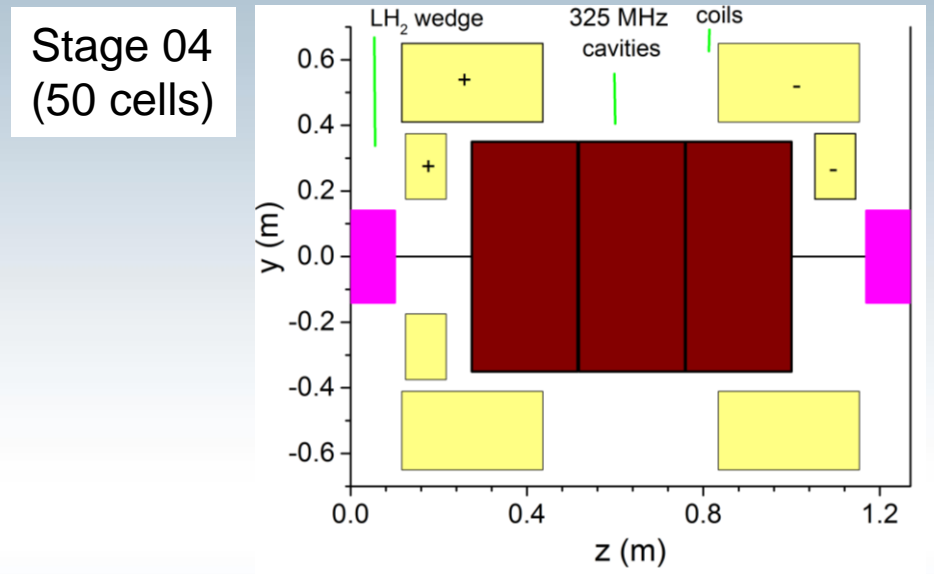
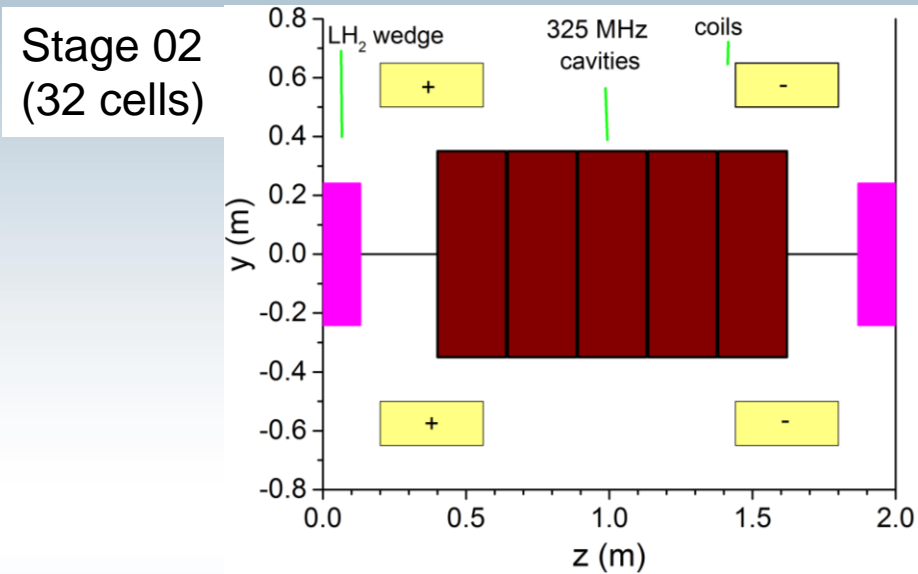
# Status of 6D Cooler

- A design of a 6D rectilinear cooling channel BEFORE the merge was presented at the last vacuum rf meeting.
- A design of a 6D rectilinear cooling channel AFTER the merge is now complete.
- Conclusion: We have a first draft of a complete 6D channel
- Today: I will show you the part of the channel after the merge.

# Channel Highlights (post-merge)

- Rectilinear channel
- 8 stages
- 480 m long
- 325 MHz (4 stages), 650 MHz (8 stages)
- First 4 stages use LH, remaining stages use LiH wedges
- Some engineering constraints are taken into account

# Lattice Visualization

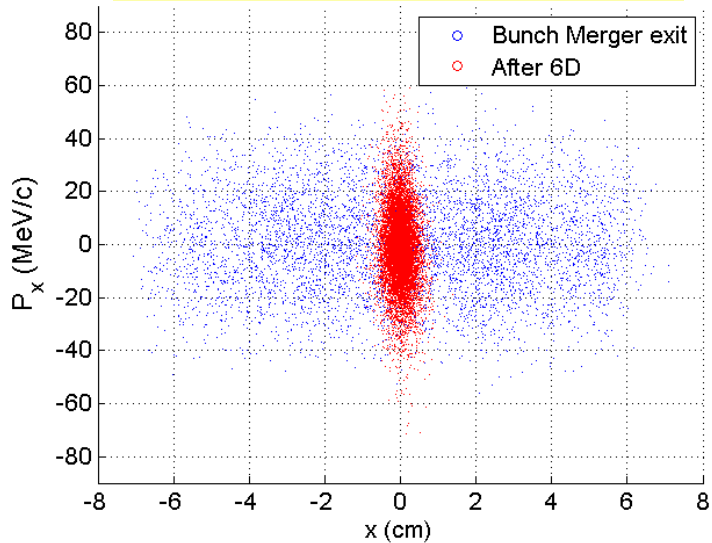


# Lattice Parameters

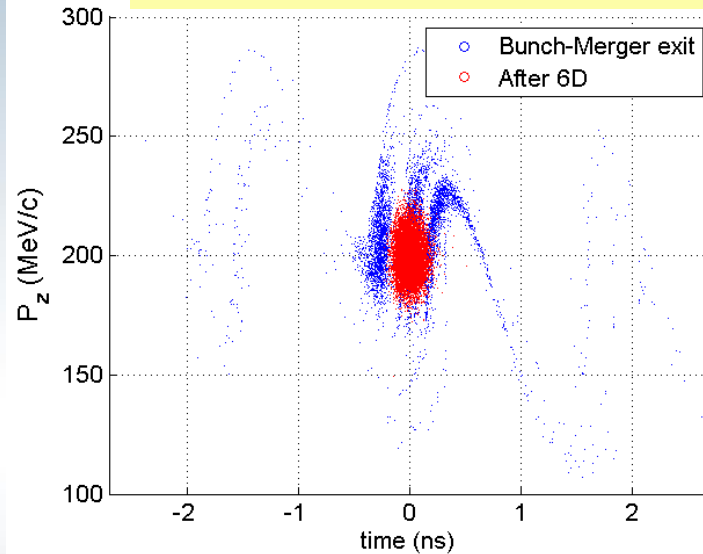
Parameters	Stage 2	Stage 4	Stage 6	Stage 8
Coil tilt (deg.)	1.3	1.1	0.7	0.8
Current density (A/mm <sup>2</sup> )	90.0	94.0/74.3	185.0/155	198.0/ 164.0
Max B on coil (T)	8.4	9.2	14.1	14.5
Max B on axis (T)	3.7	6.0	10.8	12.9
Trans. beta (cm)	27.4	13.9	5.9	3.7
Absorber angle (deg.)	117	124	90	90
Absorber type	LH <sub>2</sub>	LH <sub>2</sub>	LIH	LIH
Rf frequency (MHz)	<b>325</b>	<b>325</b>	<b>650</b>	<b>650</b>
RF phase (deg.)	41	49	49	46
RF gradient (MV/m)	19.5	22	28.5	26
Ref. Mom. (MeV/c)	200	200	198	197
Cell length (m)	2.0	1.27	0.806	0.806
Hoop Stress (MPa)	370	225	340	330

# Beam before & after Cooling

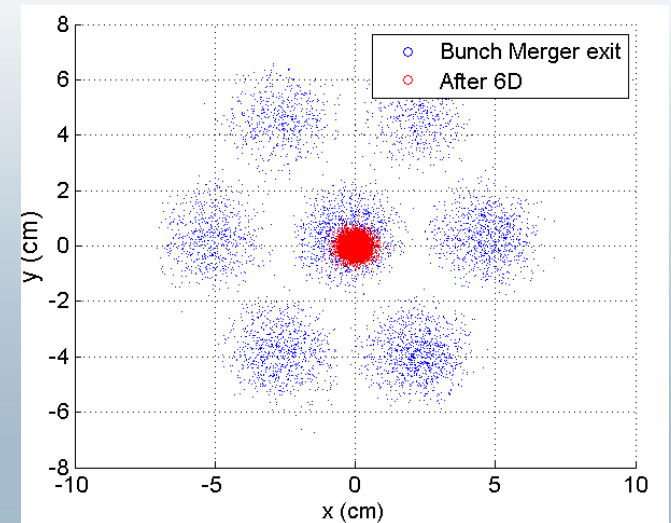
## Transverse phase-space



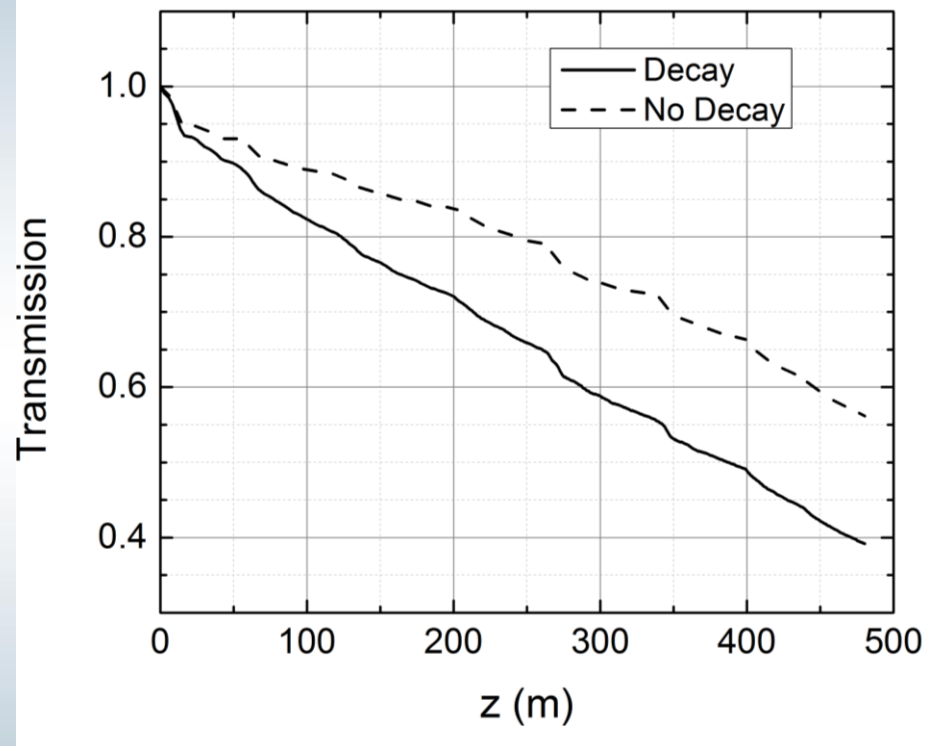
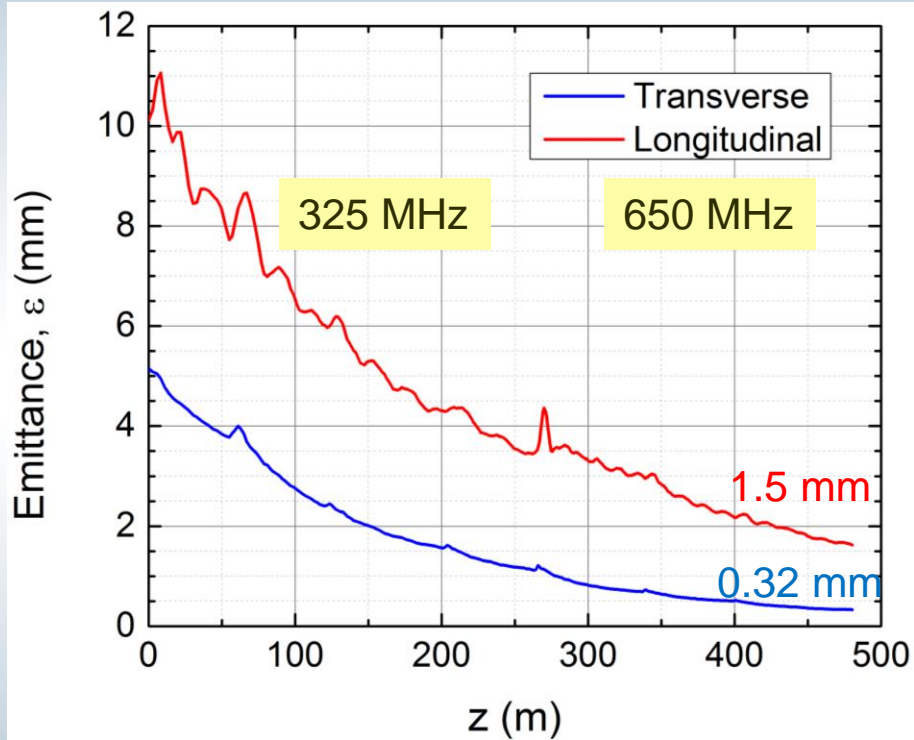
## Longitudinal phase-space



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



# Lattice Performance



# Number of Cavities

PRE 6D	f(MHz)	L(cm)	Grad(MV/m)	Number
Stage1	325	25	22	396
Stage2	325	25	22	520
Stage3	650	13.5	28	535
Stage4	650	13.5	30	272

POST 6D	f(MHz)	L(cm)
Stage1	325	24
Stage2	325	24
Stage3	325	24
Stage4	325	24
Stage5	650	12
Stage6	650	12
Stage7	650	12
Stage8	650	12



# Future work

- Rest 4 weeks perform some final optimizations (as promised at the last vacuum rf meeting).
  - Move cavities
  - Lithium Hydride on pre-merge
  - G4BL simulation of one stage
- Write a report (start mid-December)