



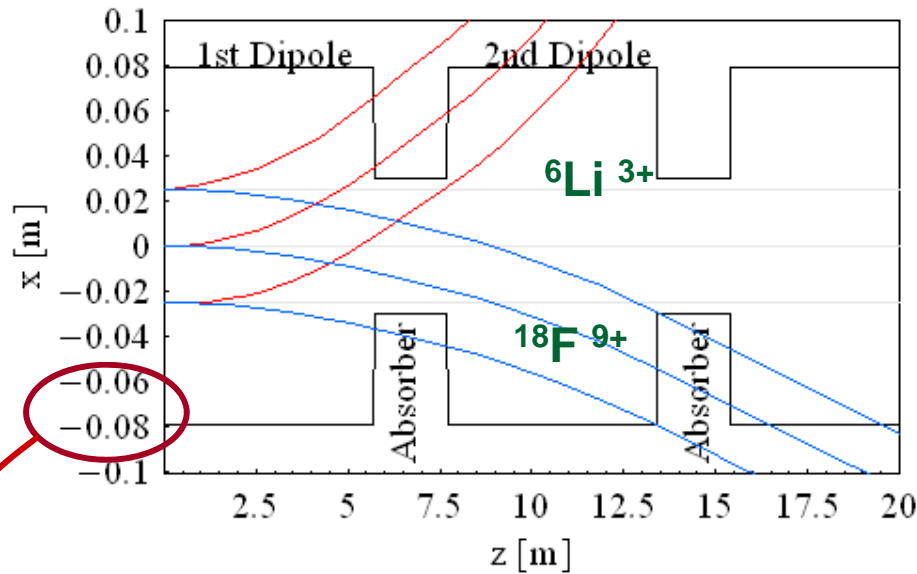
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# Status on decay ring magnet design and cryogenics

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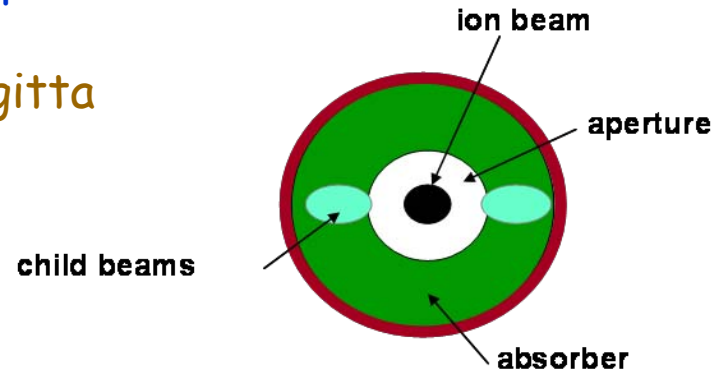
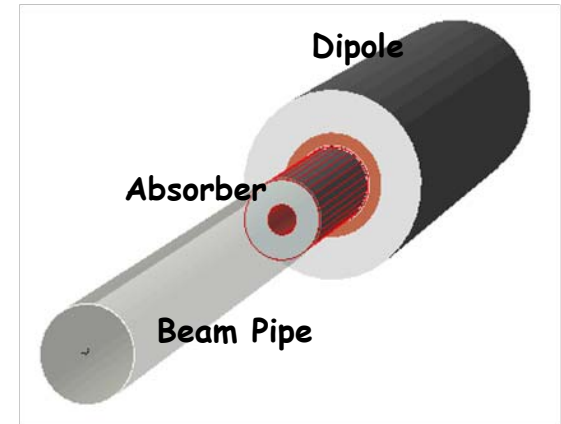
Elena Wildner

# Large Aperture Requirements

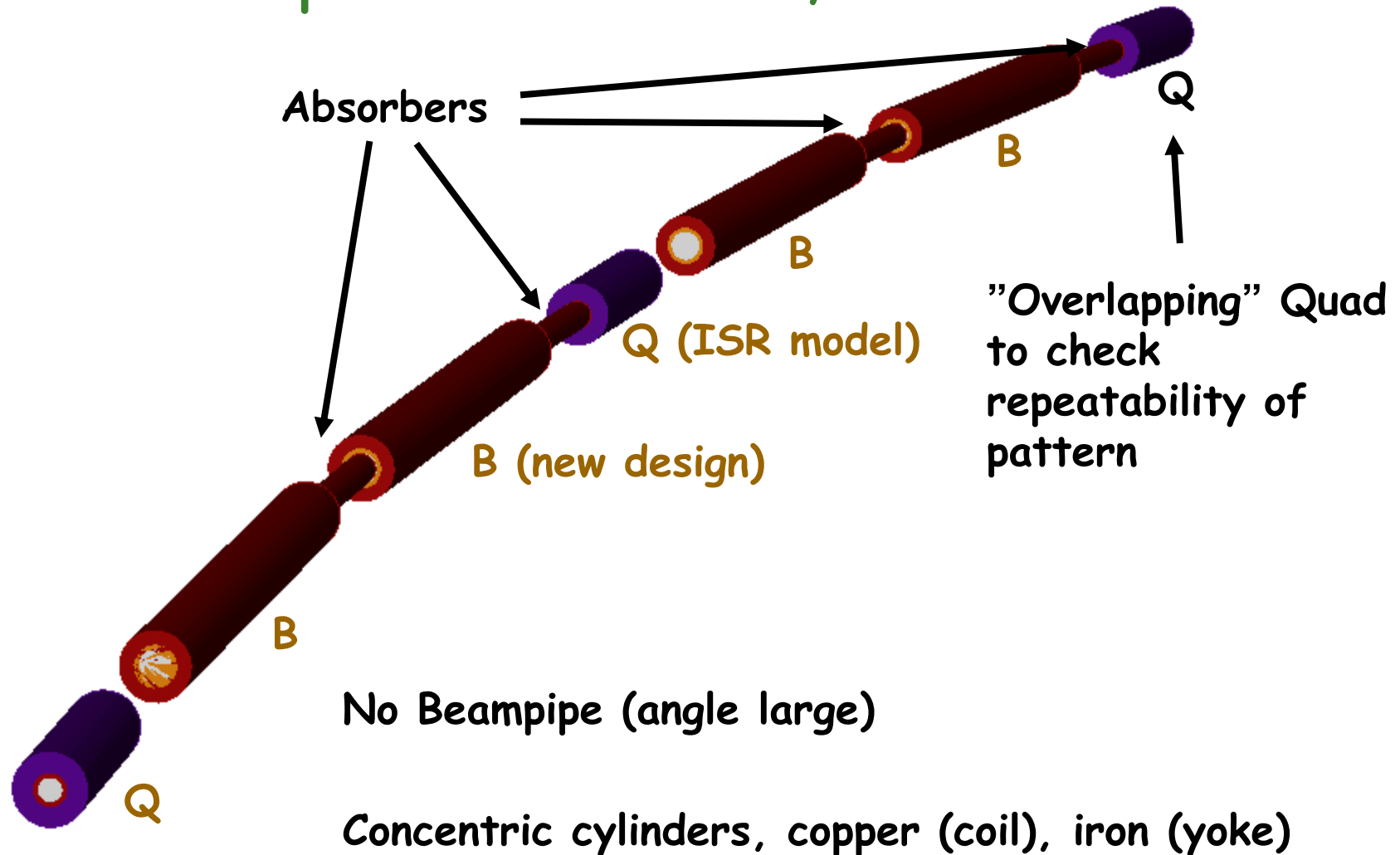


8 cm radius needed for the horizontal plane where the decay products cause daughter beams + 1 cm for the sagitta (no curved magnet)

4 cm for the vertical plane

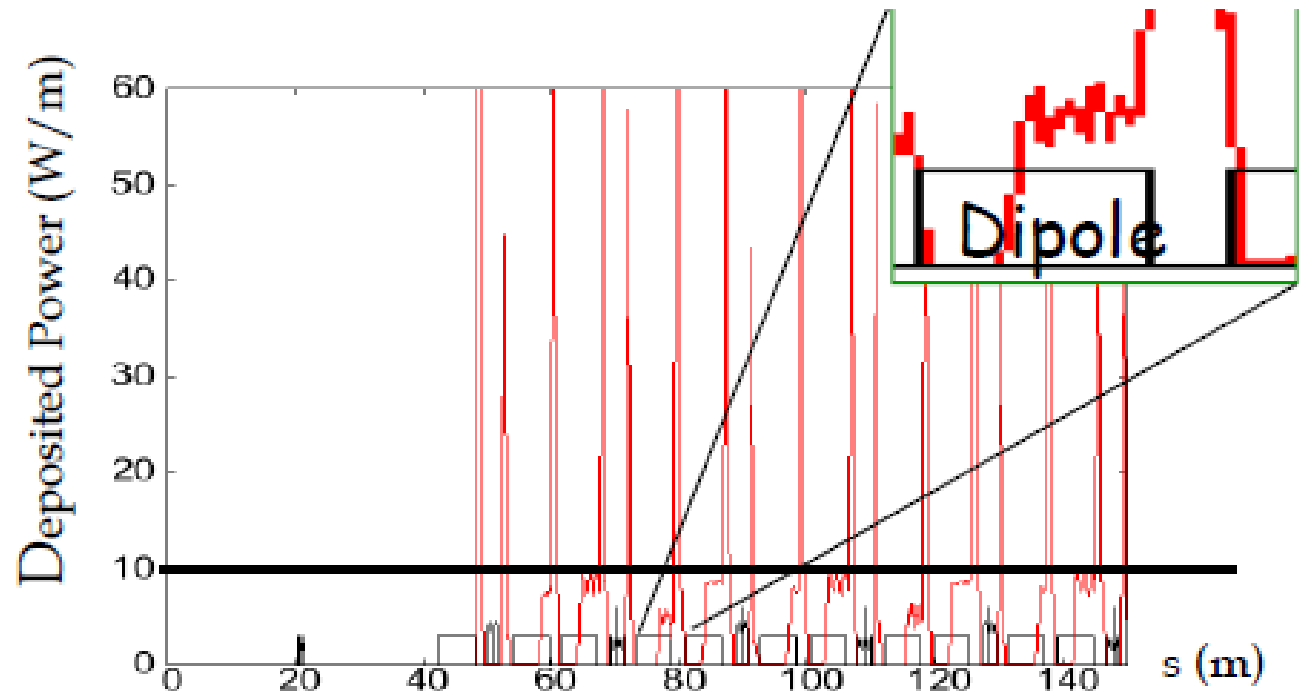


# Heat Deposition Model, one cell

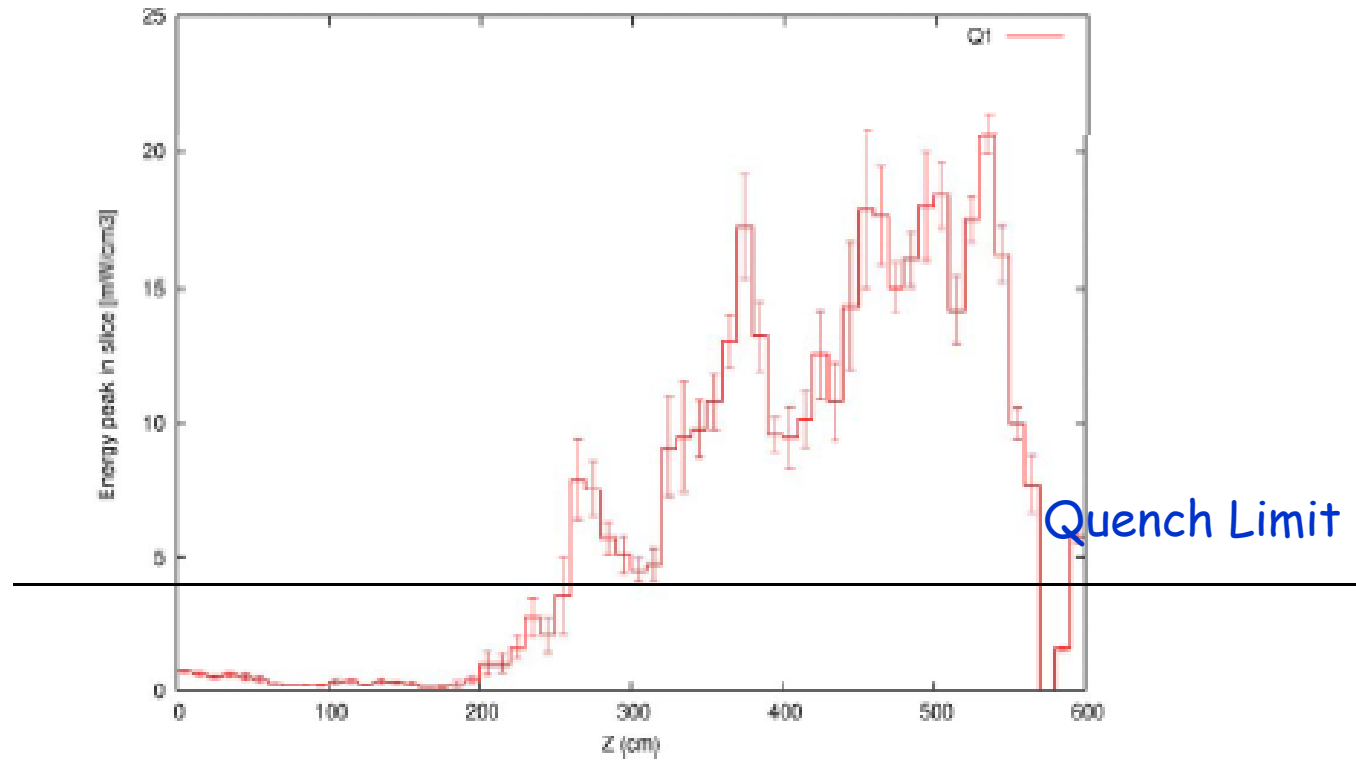


# Energy deposition pattern

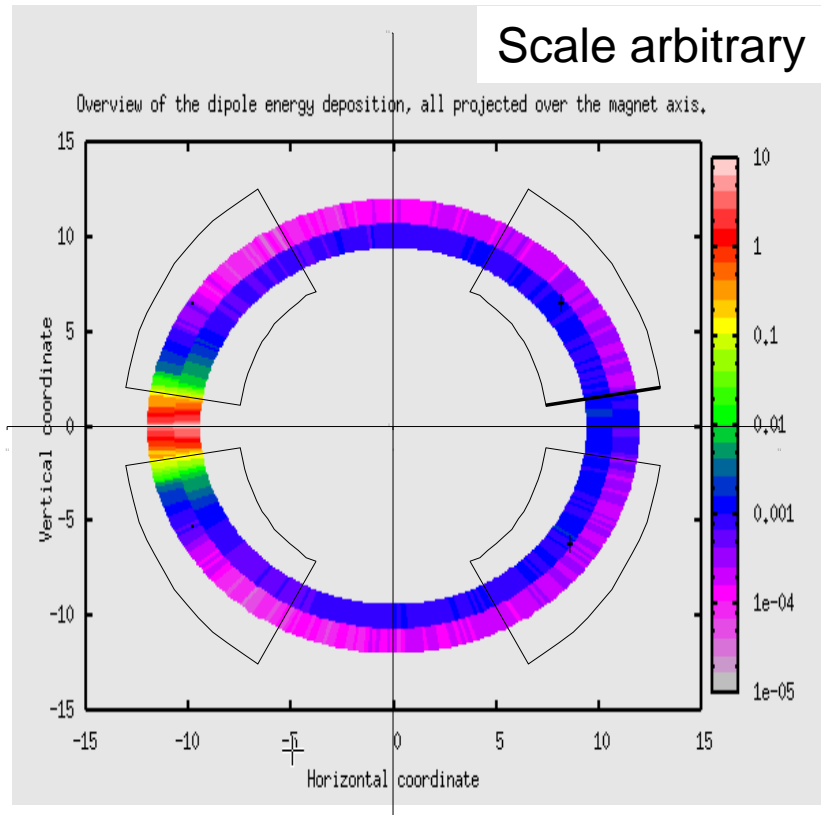
Simulations A. Chance



# Peak energy deposition in dipole



# Open midplane superconducting magnets for decay ring



- Design ok for the present layout of the decay ring
- check for energy deposition
- radio protection (B and Li)
- check if larger apertures with liner a better option

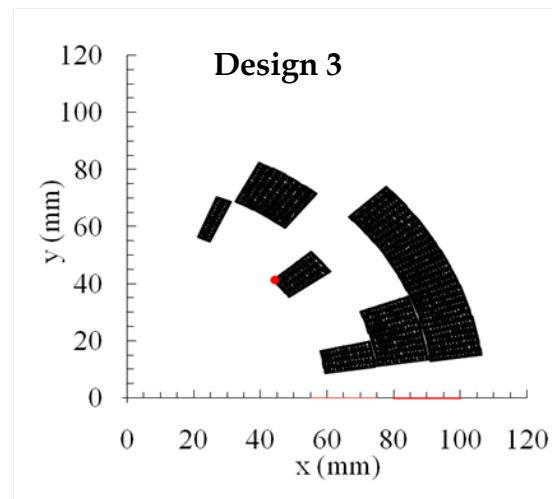
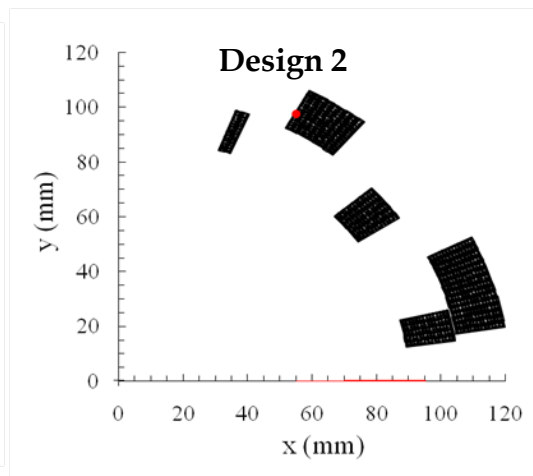
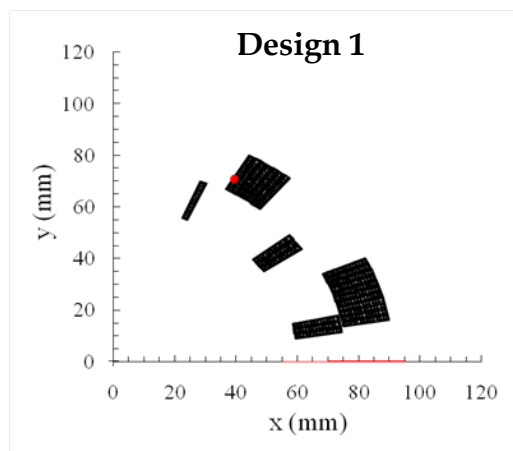
Acknowledgments (magnet design, cryostating, cryogenics):

Jens Bruer, F Borgnolutti, P. Fessia, R. van Weelderen, L. Williams and E. Todesco (CERN)

# Three designs, Decay Ring Dipole

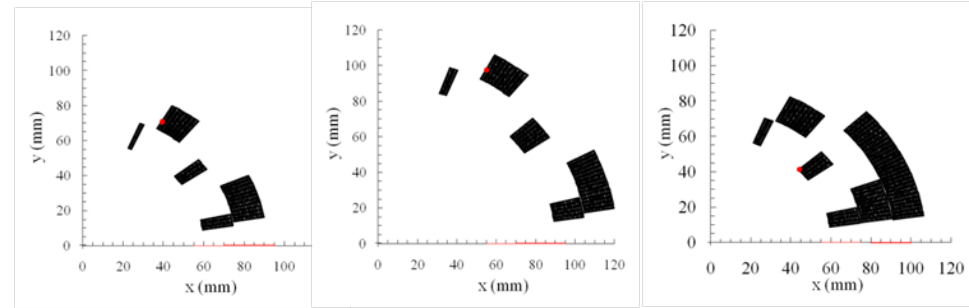
Design	1	2	3
Aperture radius (mm)	60	90	60
$B_{ss}$ at 1.9 K (T)	6.5	6.8	8.7
Operational field at 1.9 K (T)	5.2	5.5	7.0
$B_{ss}$ at 4.2 K (T)	4.9	5.3	6.7
Operational field at 4.2 K (T)	4.0	4.2	5.4
Gap in midplane (mm)	8.9	12.5	8.7
Yoke (mm)	180	270	240

Courtesy Jens Bruer



# Cost estimation, Decay Ring Dipole

- For magnet fabrication and assembling, calculated for a 13 m long dipole



Design 1

Design 2

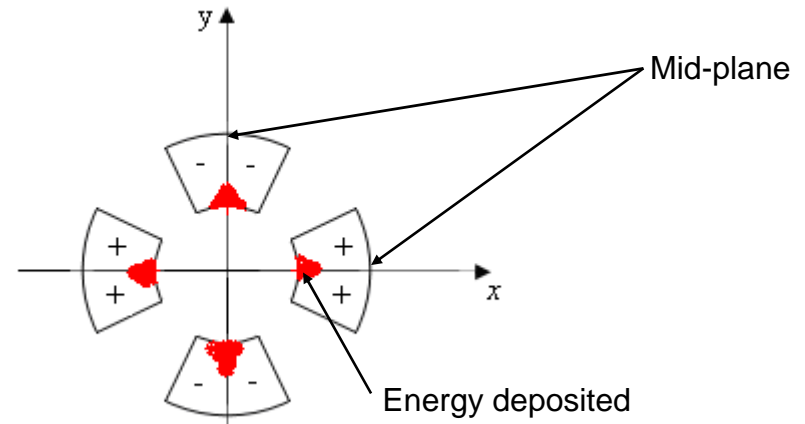
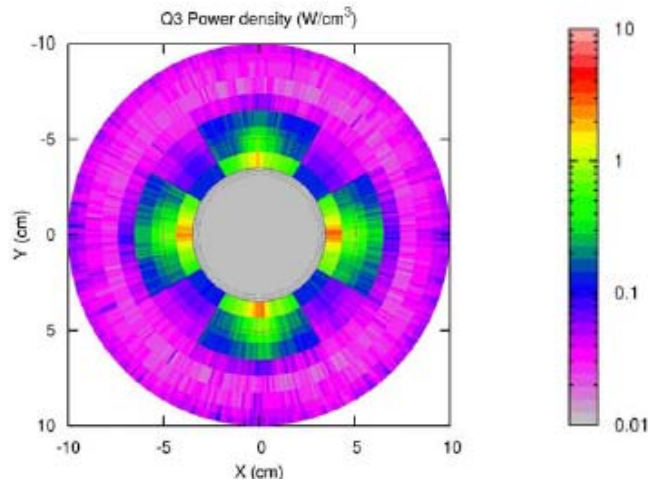
Design 3

**Requires 1.9K !!**

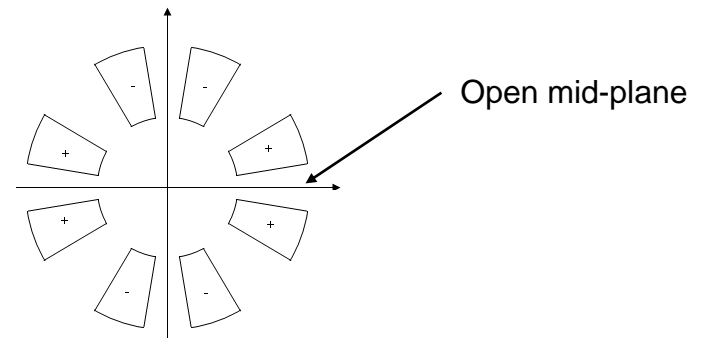
Cost (MCHF per unit)	Design 1	Design 2	Design 3
Magnet (material + fabrication)	0.71	0.76	0.82
Cryostat	0.1	0.1	0.1
Cryoplants at 1.9 K	0.3	0.3	0.3
Cryoplants at 4.5 K	0.2	0.2	0.2
Total at 4.5 K	1.01	1.06	1.12
Total at 1.9 K	1.11	1.16	1.22



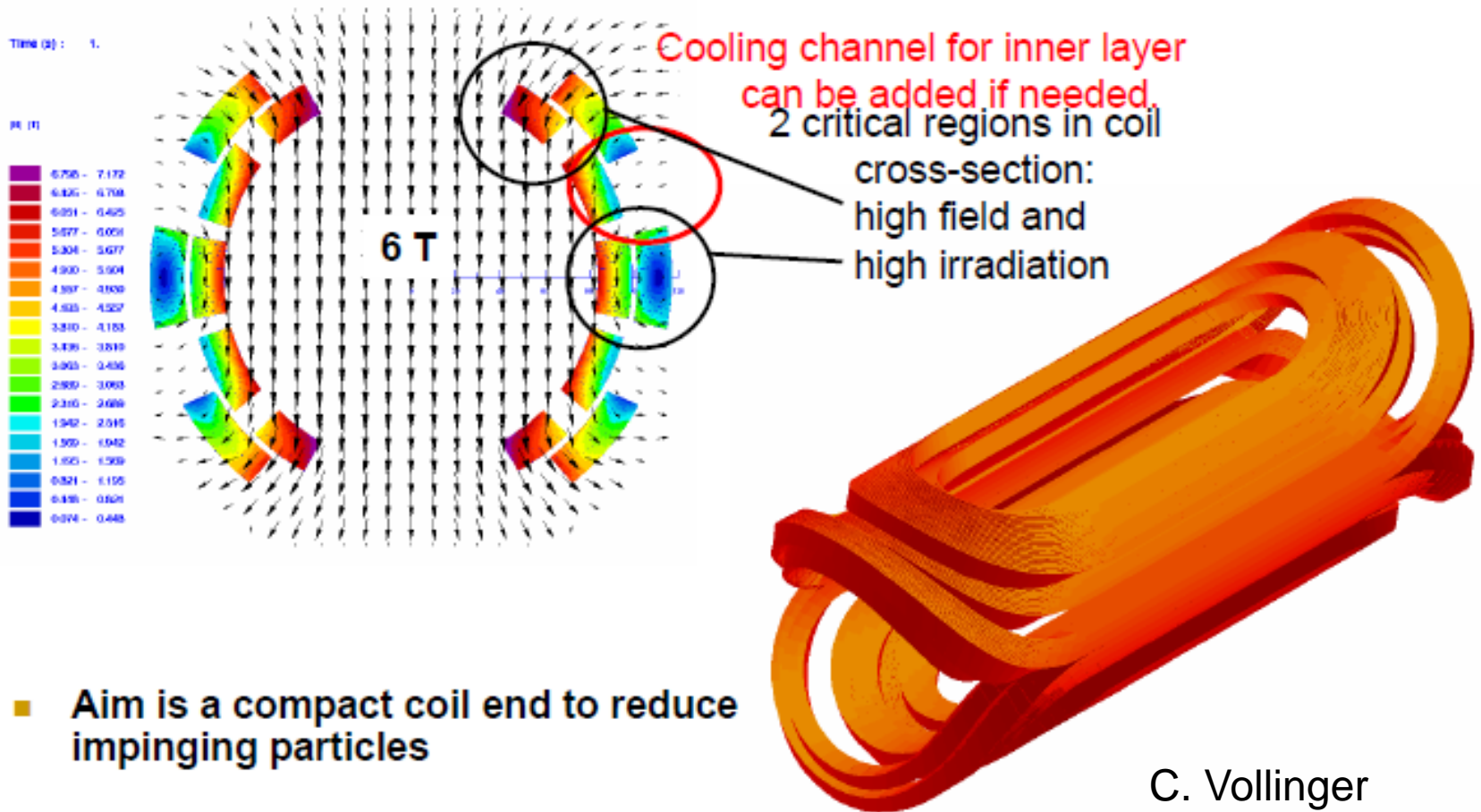
# Decay ring quadrupole



See following talk by F. Borgnolutti



# Recall: large aperture dipole designed



# Issues remaining

- Design of magnets: open midplane feasible, 1.9K necessary, no margin for shorter arcs
- Special cooling systems in yoke at higher temperature (20 K?) have to be examined
- Some liberty for opening angle, limit for present layout ~10 degrees total opening
- A liner with higher temperature cooling (cm thickness), can be an alternative to open midplane
- If 13 m long curved magnet: no liner can be inserted (sagitta)
- Tests with beam would complete the study (Ne beam source particles have to be recalculated for cell in arc)
- Maintenance and handling (radioprotection), ideas?

# New ideas for maintenance and handling?

