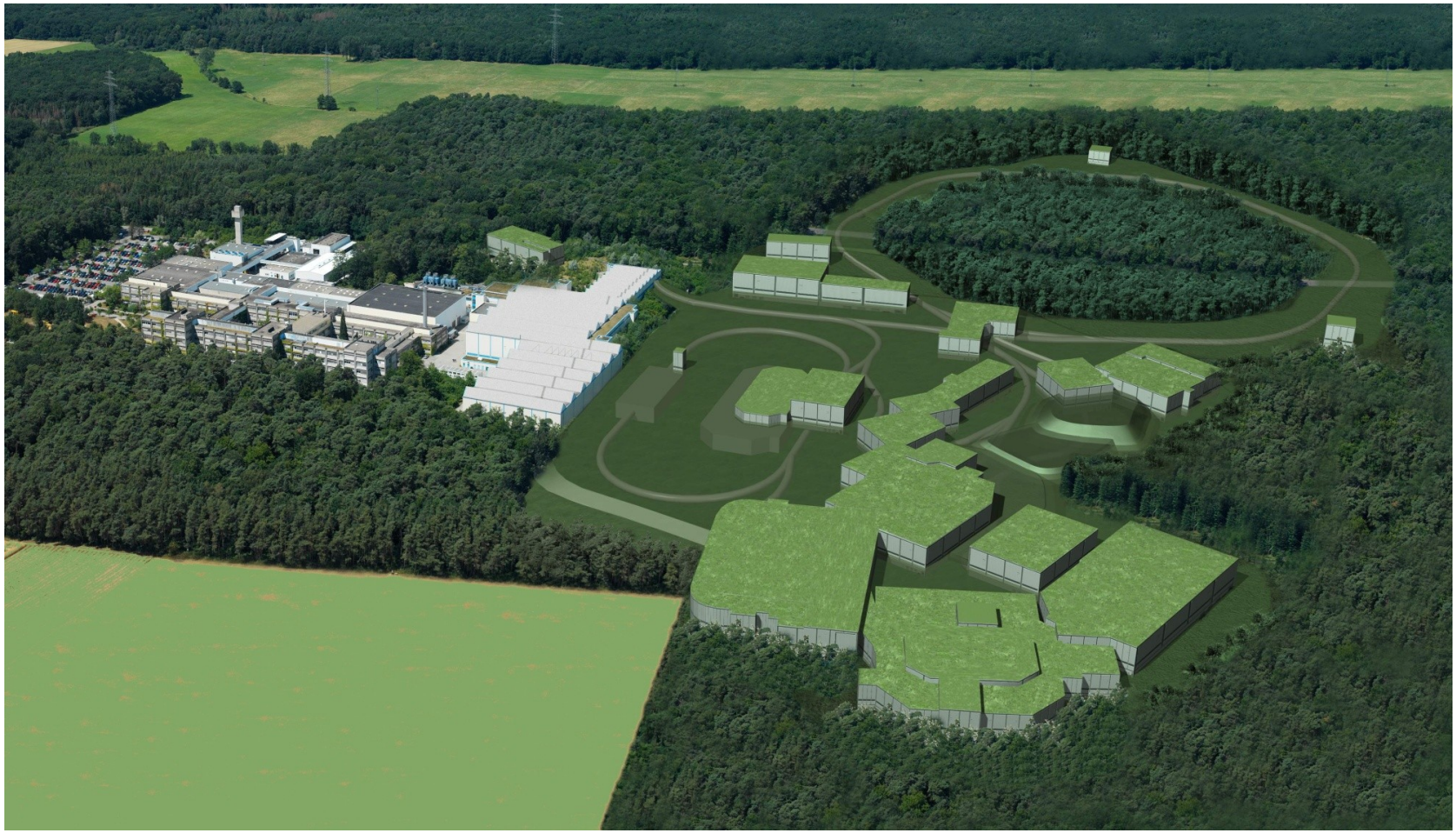
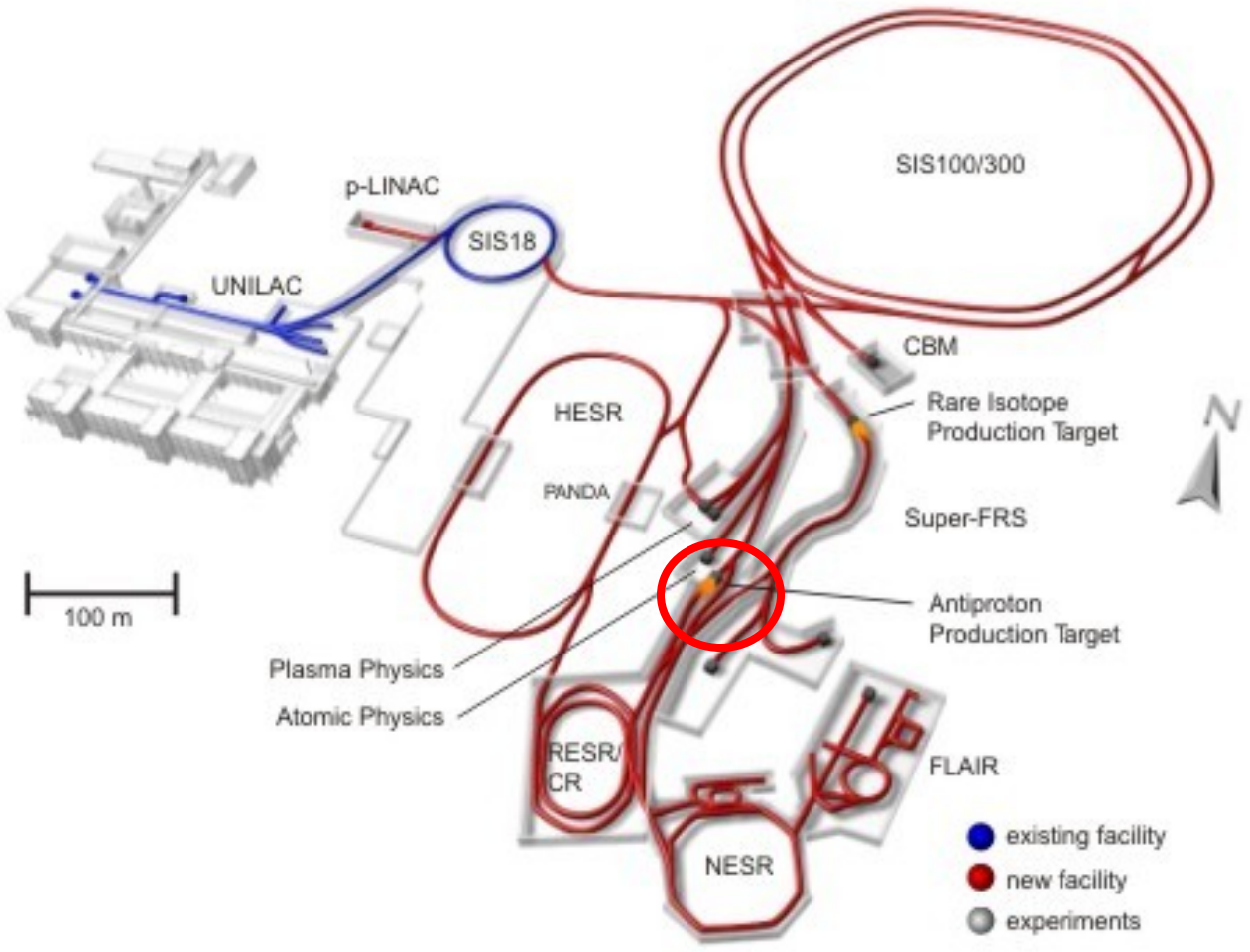
FLUKA calculations for the pbar separator at FAIR

Vitaliy Gostishchev

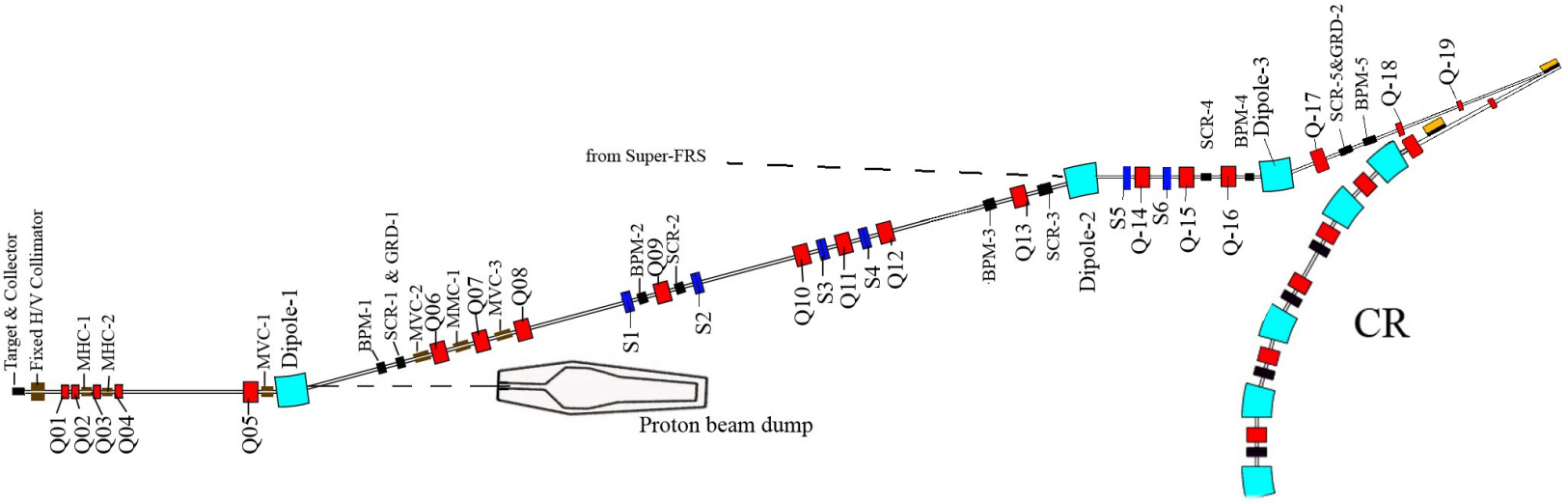
GSI and FAIR facility



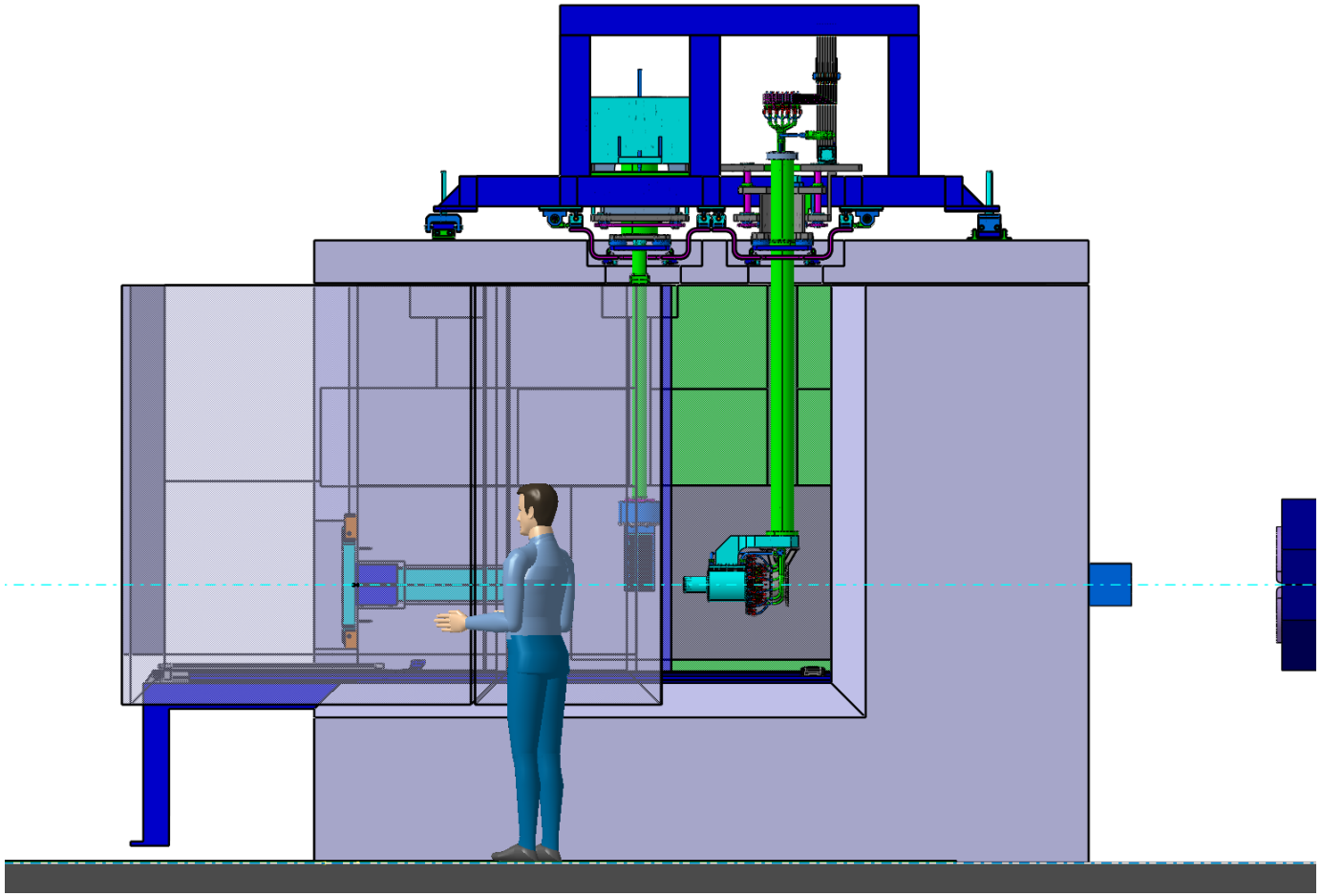
FAIR facility



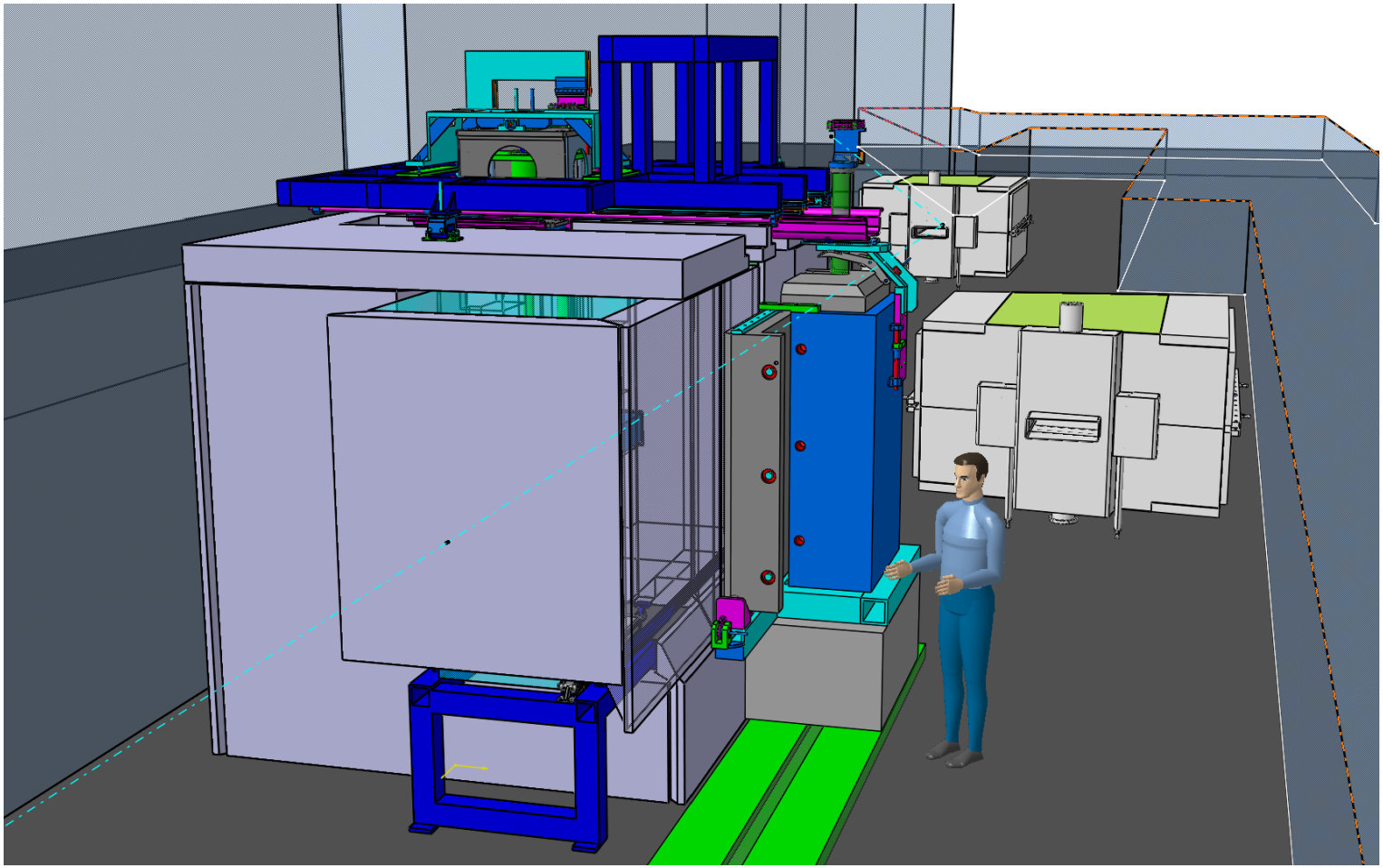
Layout of the pbar target area



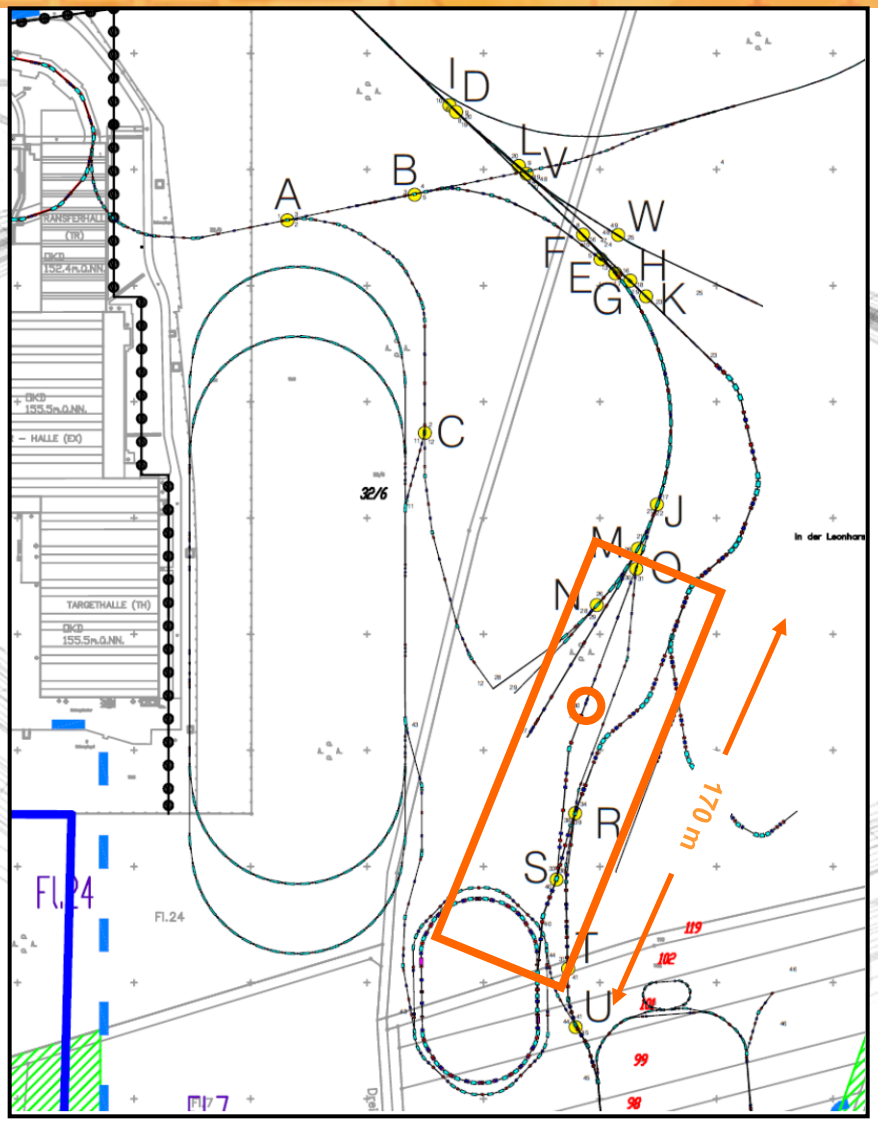
Target Station



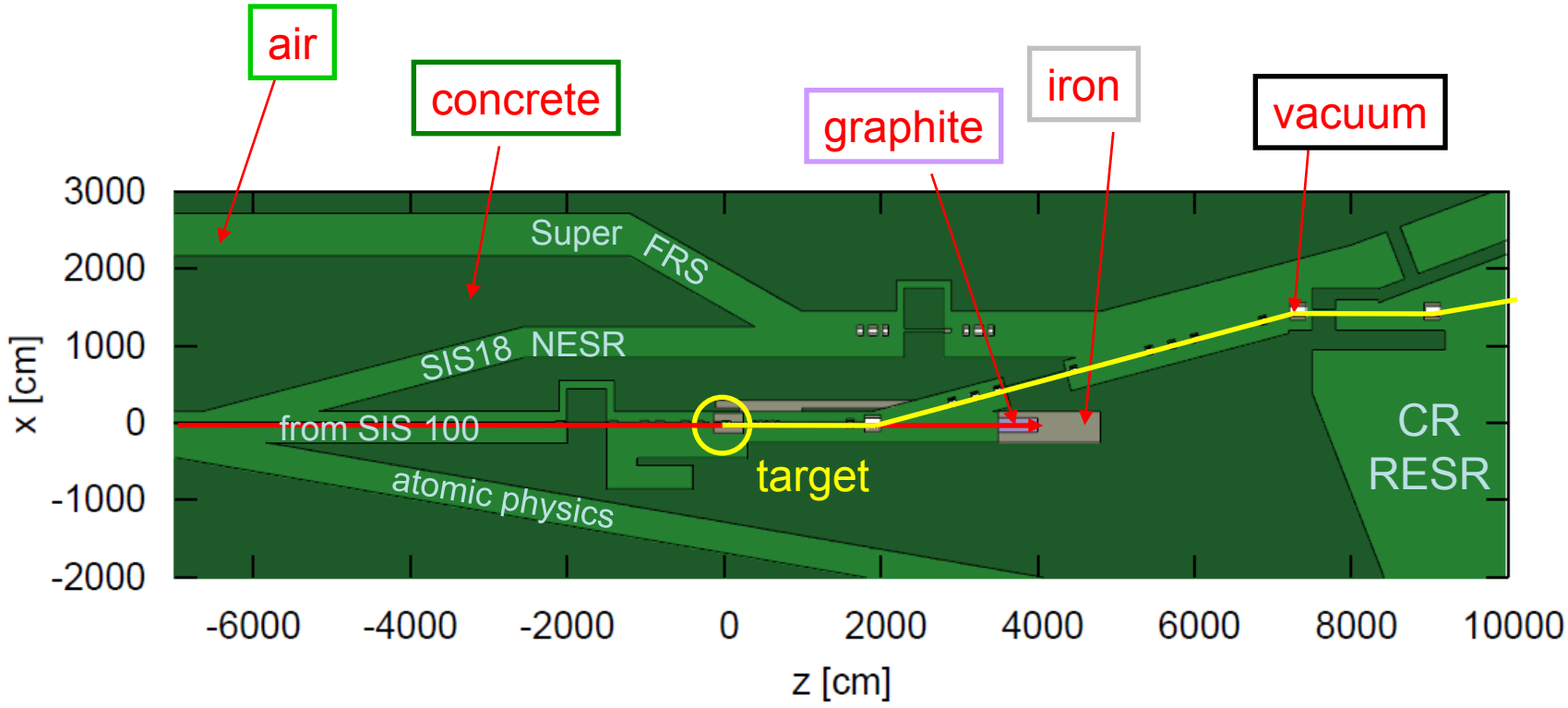
Target Station



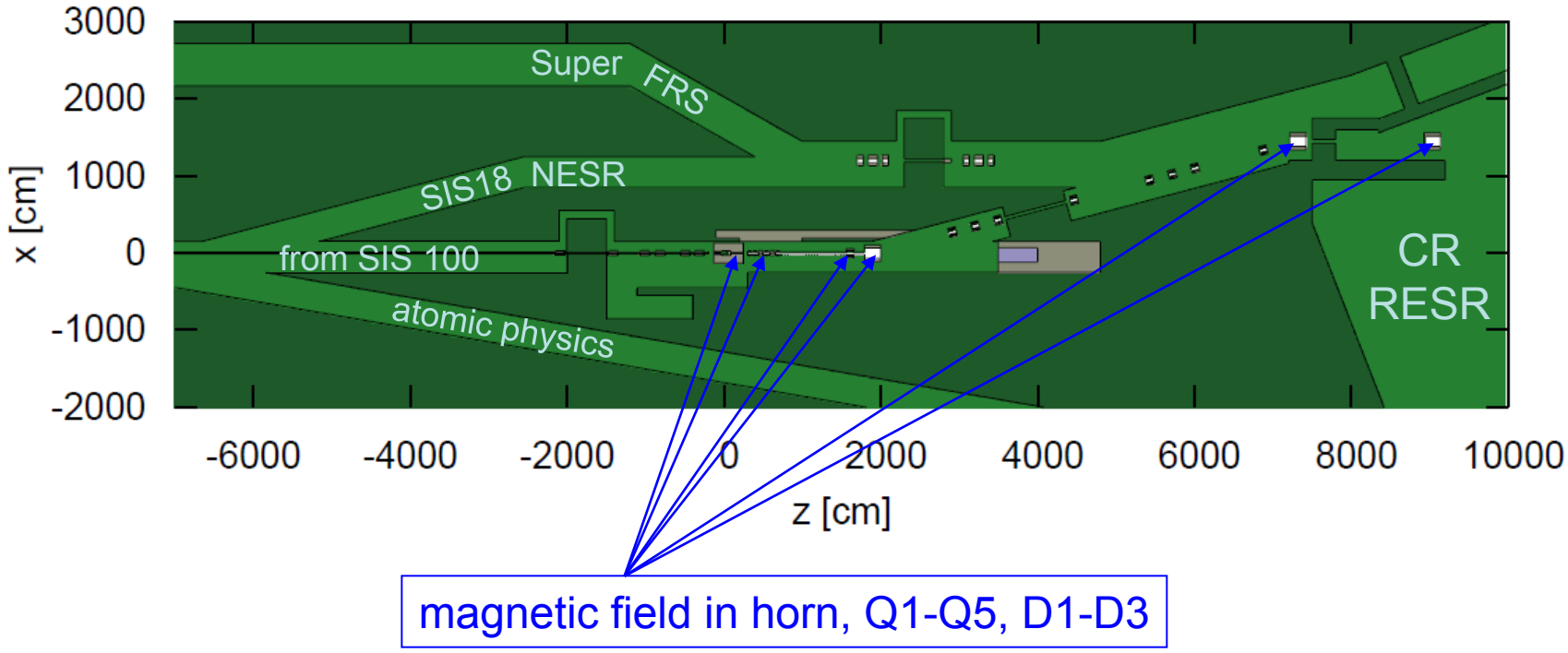
Dose rates around the pbar target



Fluka input, top view 1

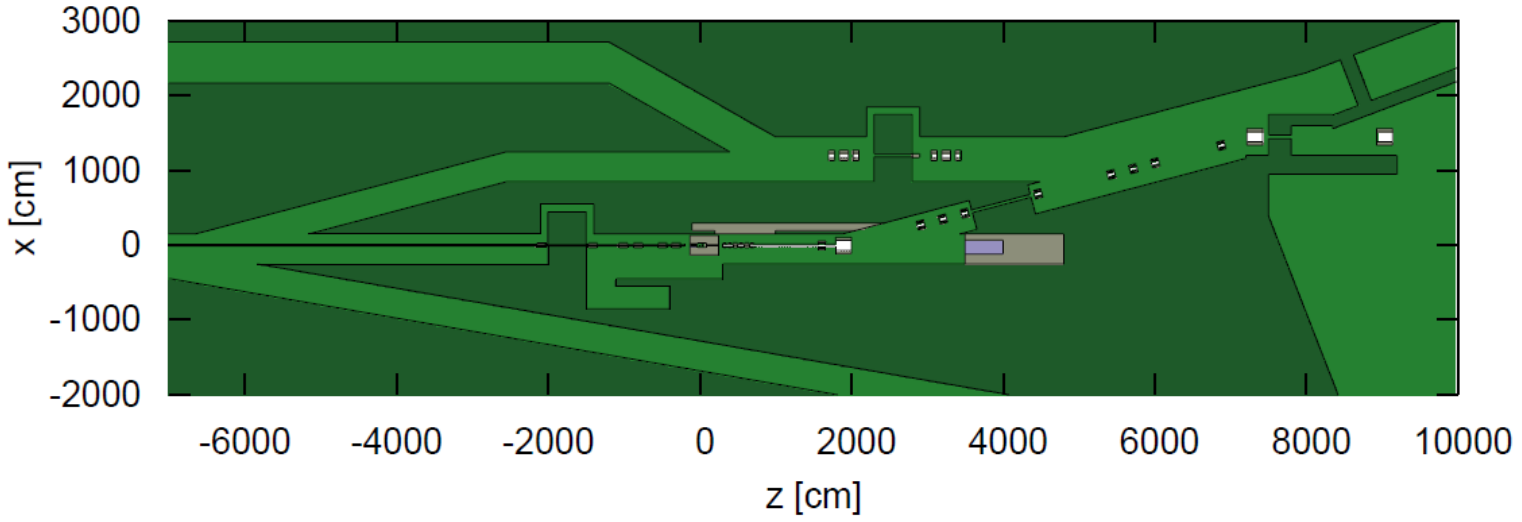


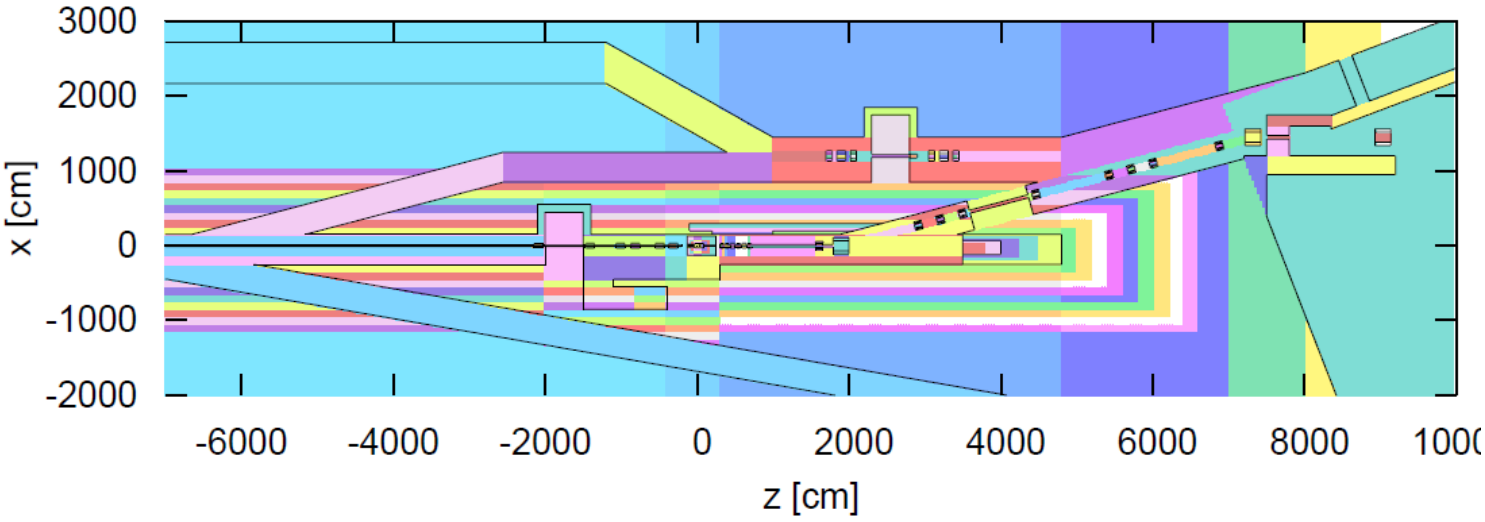
Fluka input, top view 2



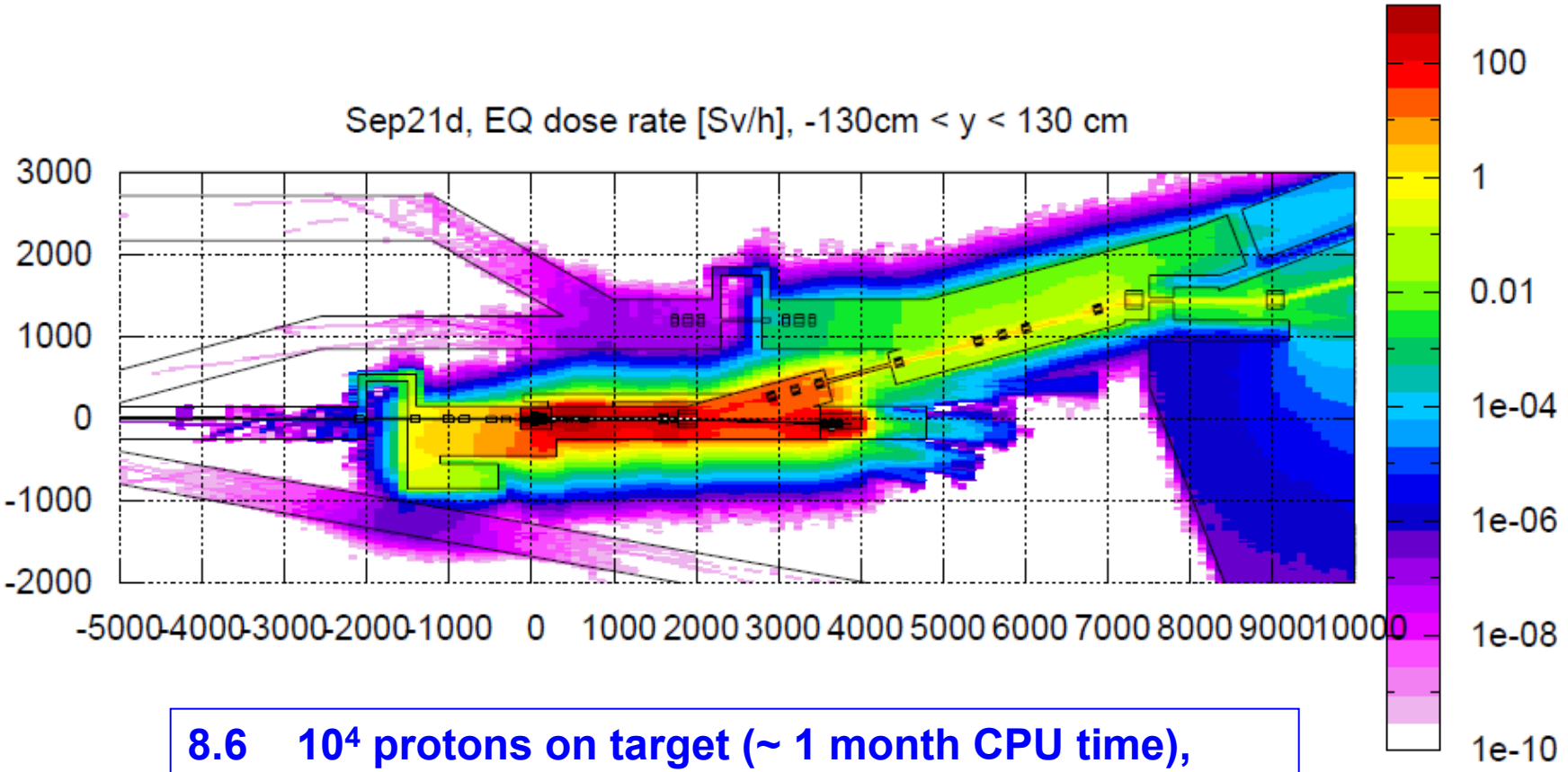
magnetic field in horn, Q1-Q5, D1-D3

Good statistics in a reasonable CPU time: Importance Biasing



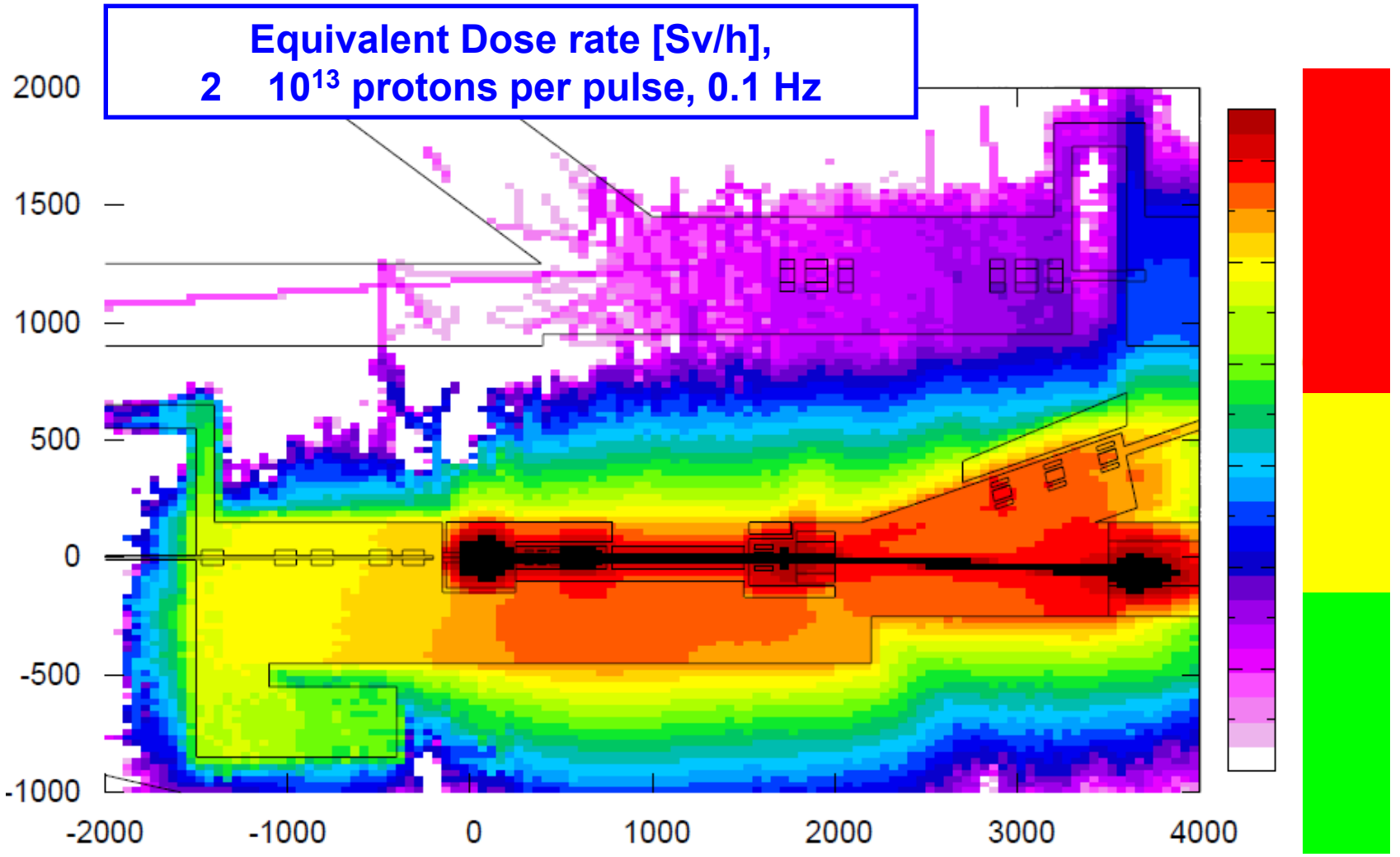


Equivalent dose rates during operation

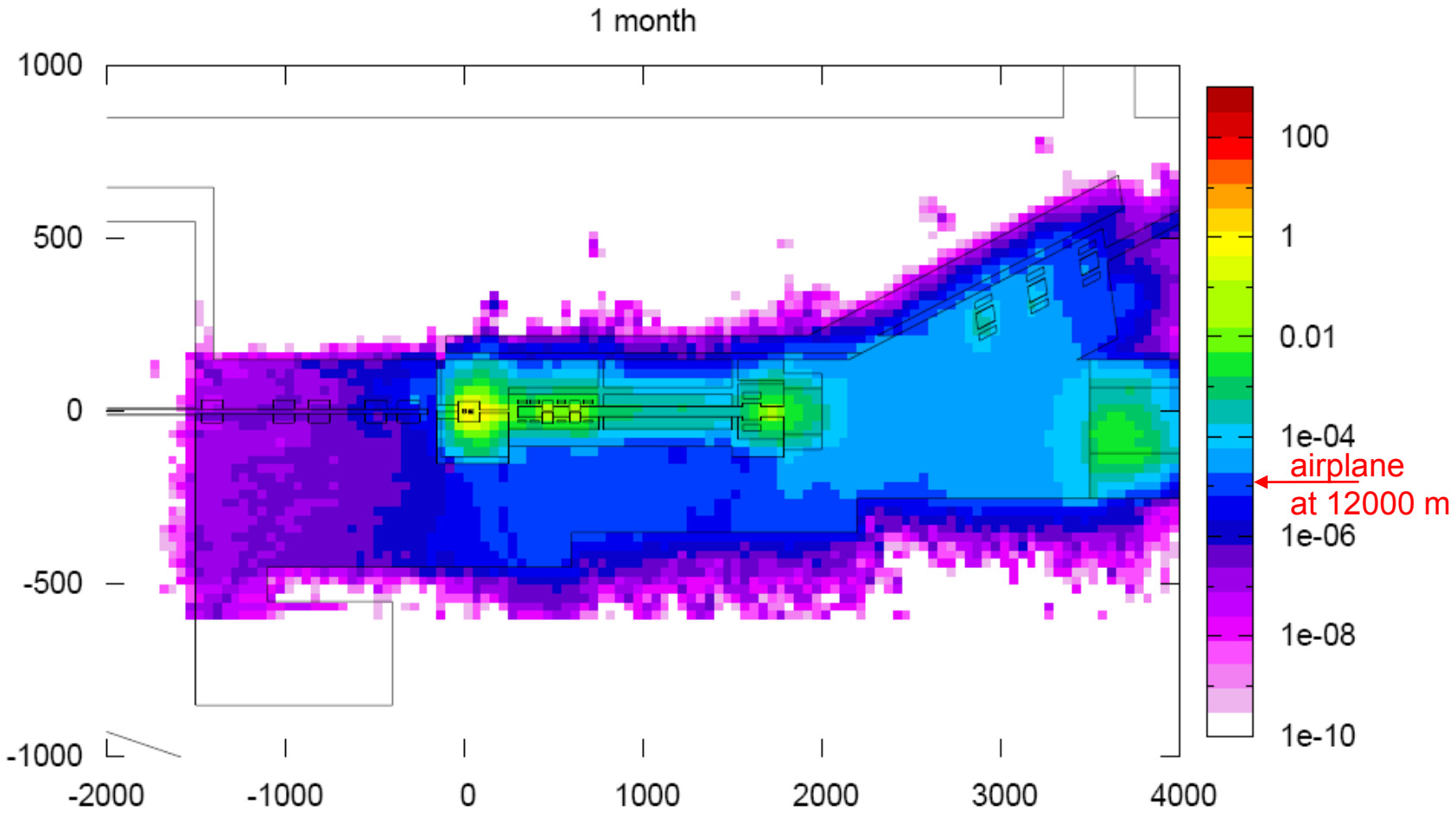


8.6 10^4 protons on target (~ 1 month CPU time), importance 10^{-4} (target) – 10^4 (Super FRS tunnel)

Equivalent dose rates during operation



Induced Activity after Shut-Down

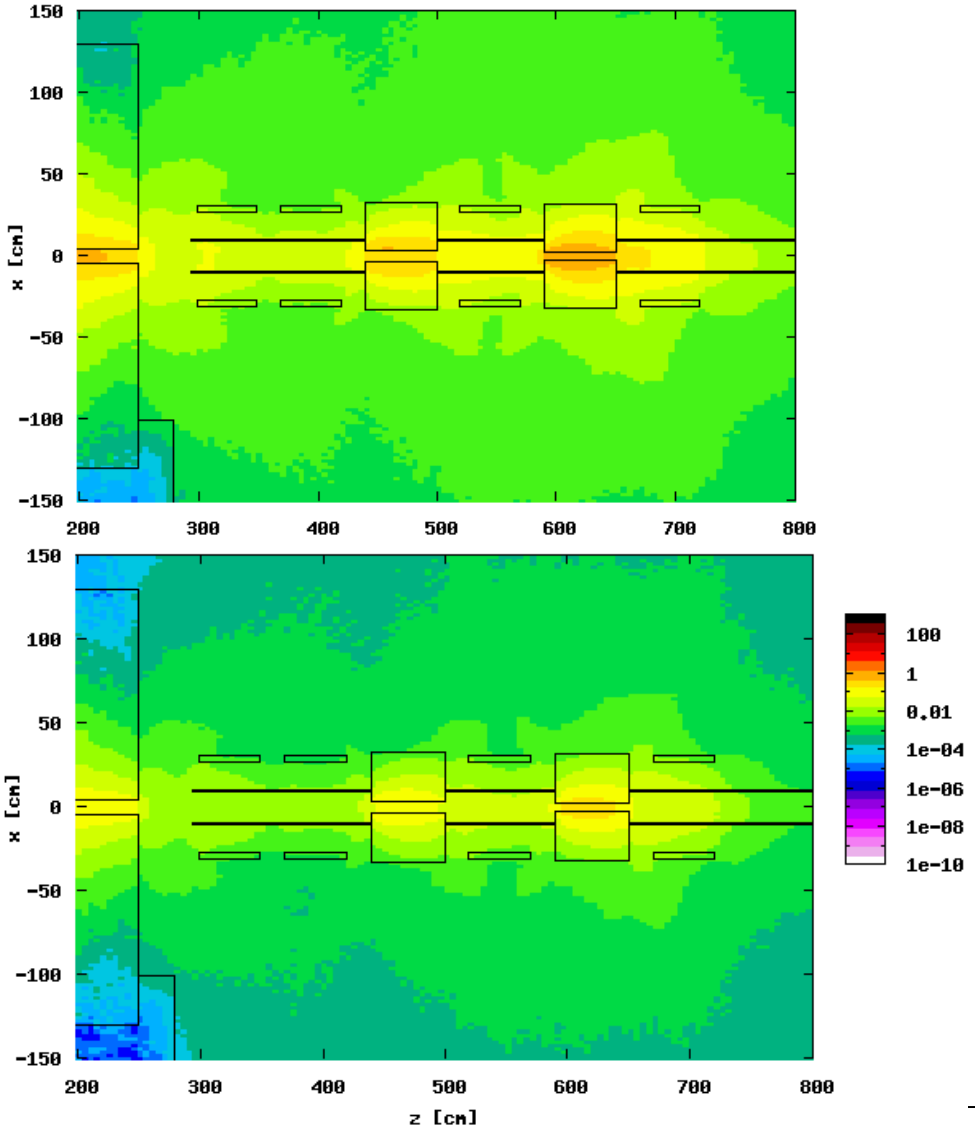


FLUKA: Induced Activity

Cooling time

1 week

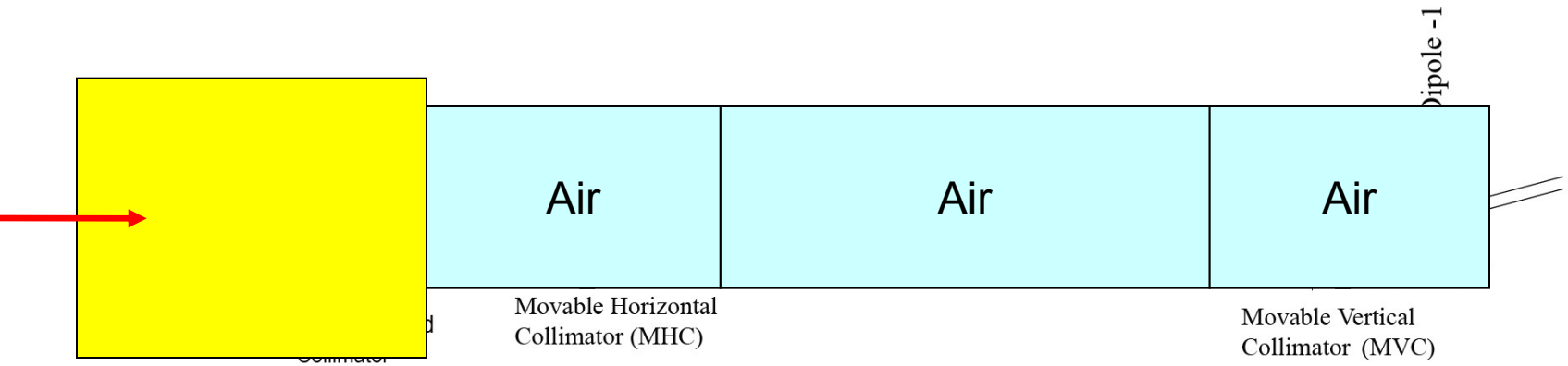
1 year



Step by step calculations

The calculations were performed with two codes:

- FLUKA: interaction with matter
  particle tracking in regions without magnetic fields
- Pbartrack: particle tracking in vacuum



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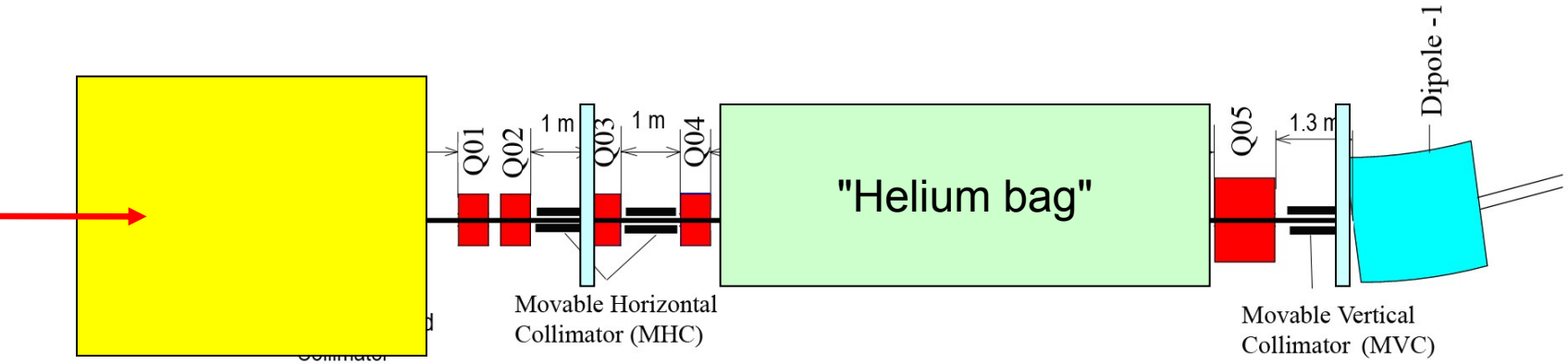


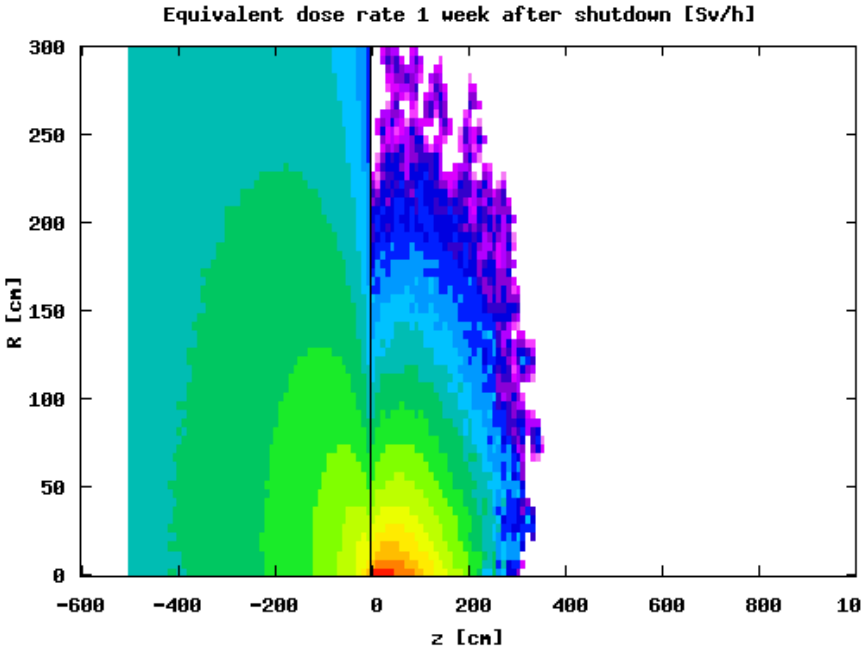
Results

Particle	Helium/ Air	Losses up to septum	Statistical errors
pbar	Air	8.0 %	0.5 %
pbar	Helium		0.22 %
p	Helium		

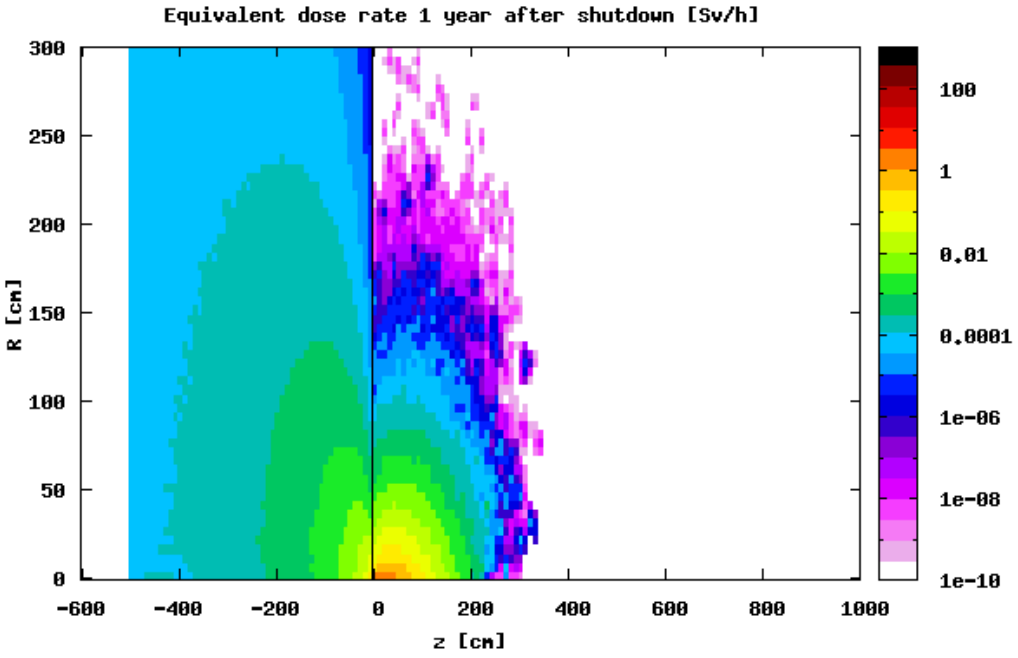
Annihilation: (0.9 0.3) %

Beam dump. Iron 1

1 week



1 year

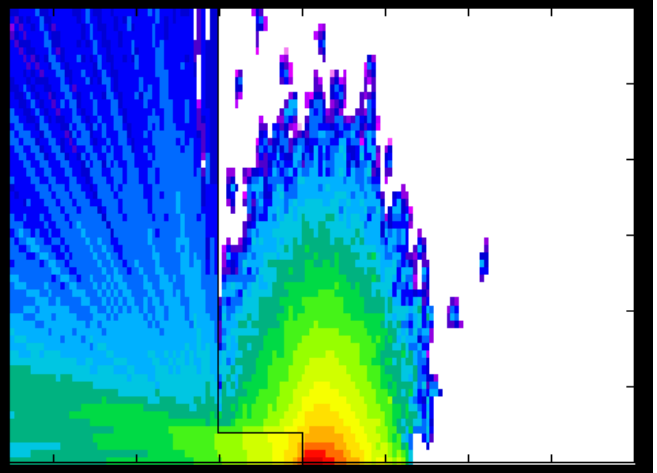


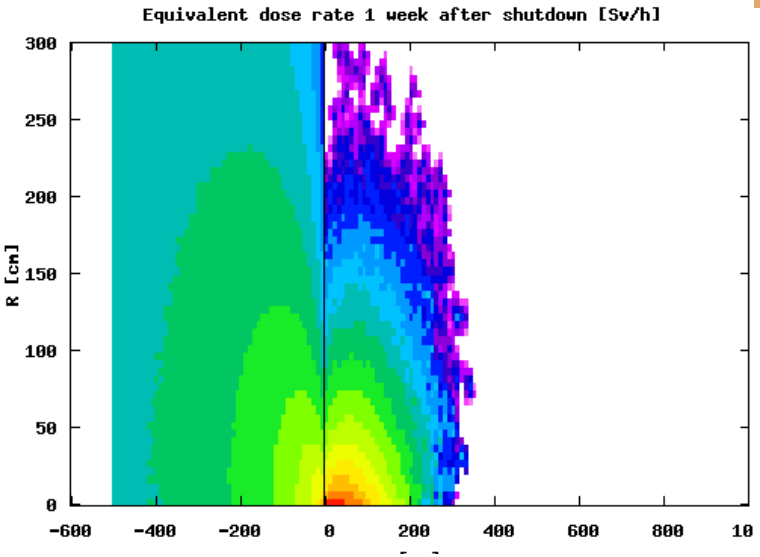
Purple means free access!

Blue means restricted access!

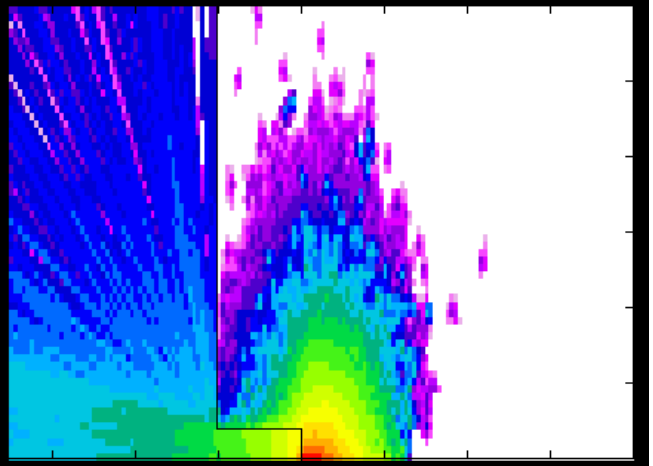
Beam Dump. Iron 2

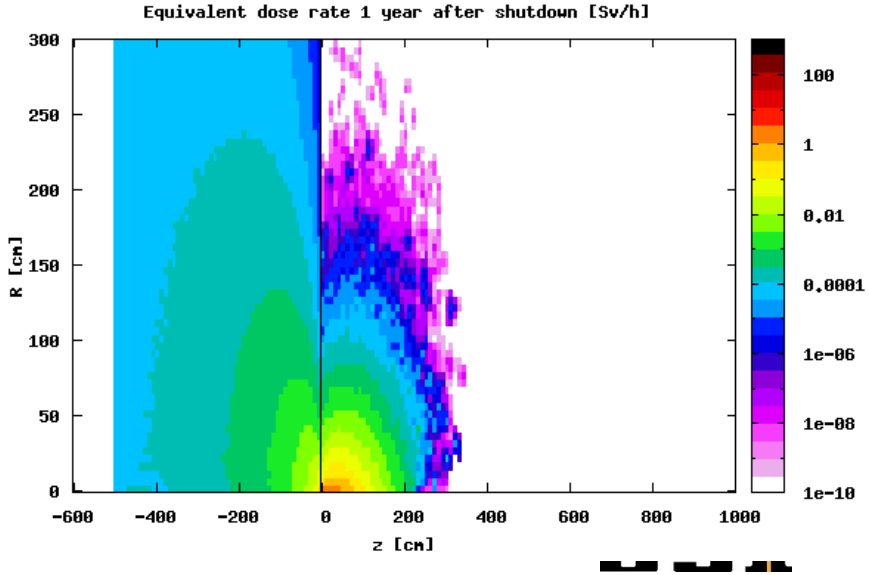
1 week





1 year

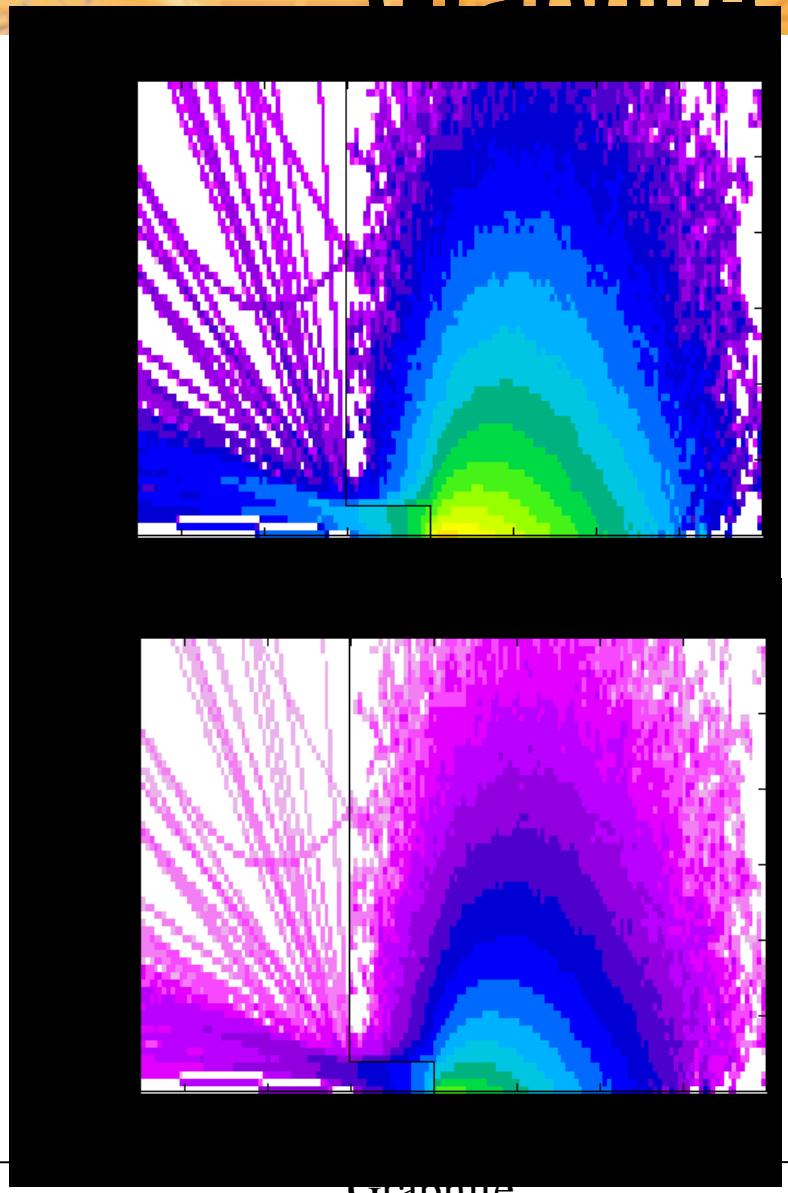


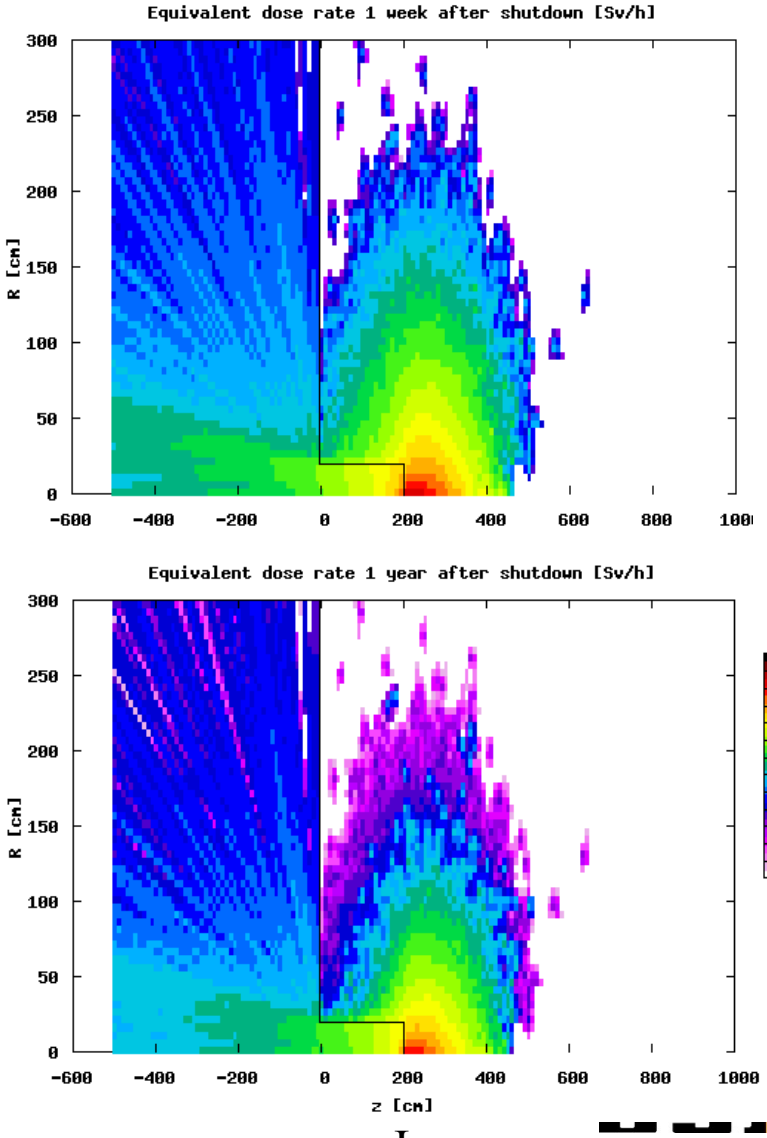


Beam Dump. Graphite and iron

1 week

1 year

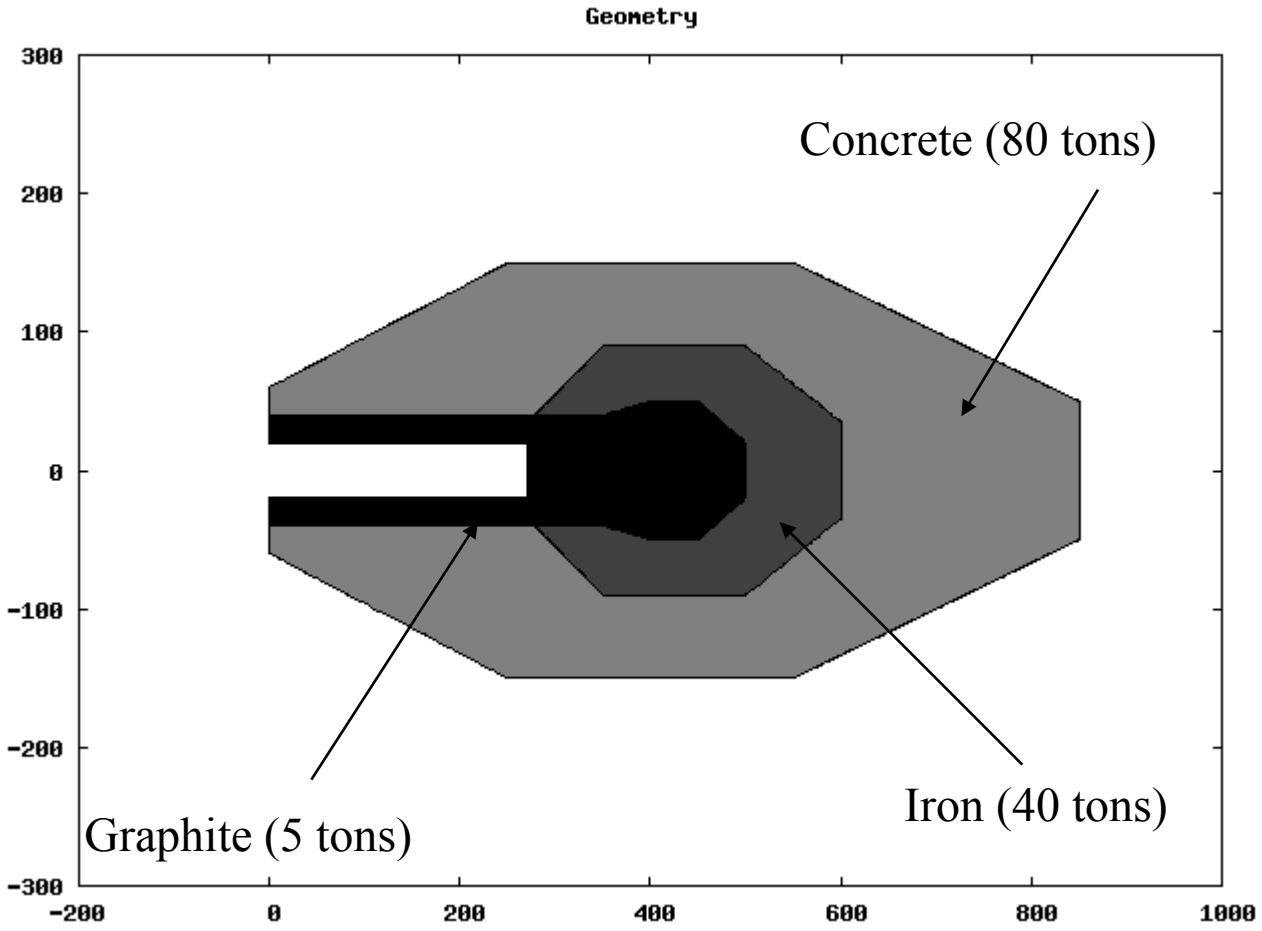




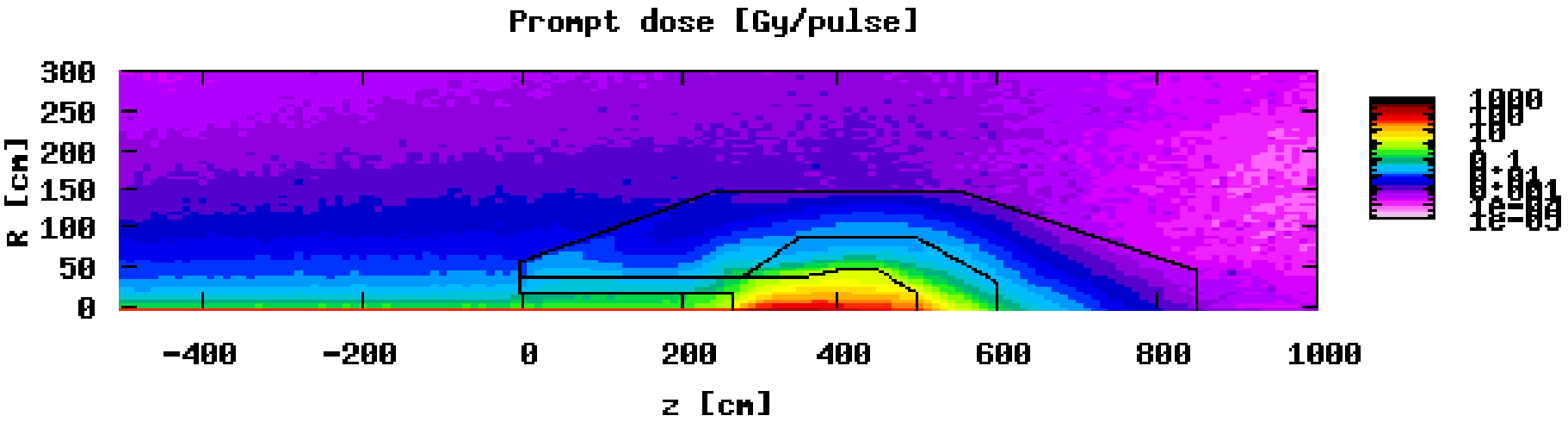
Graphite

Iron

Beam dump. Design

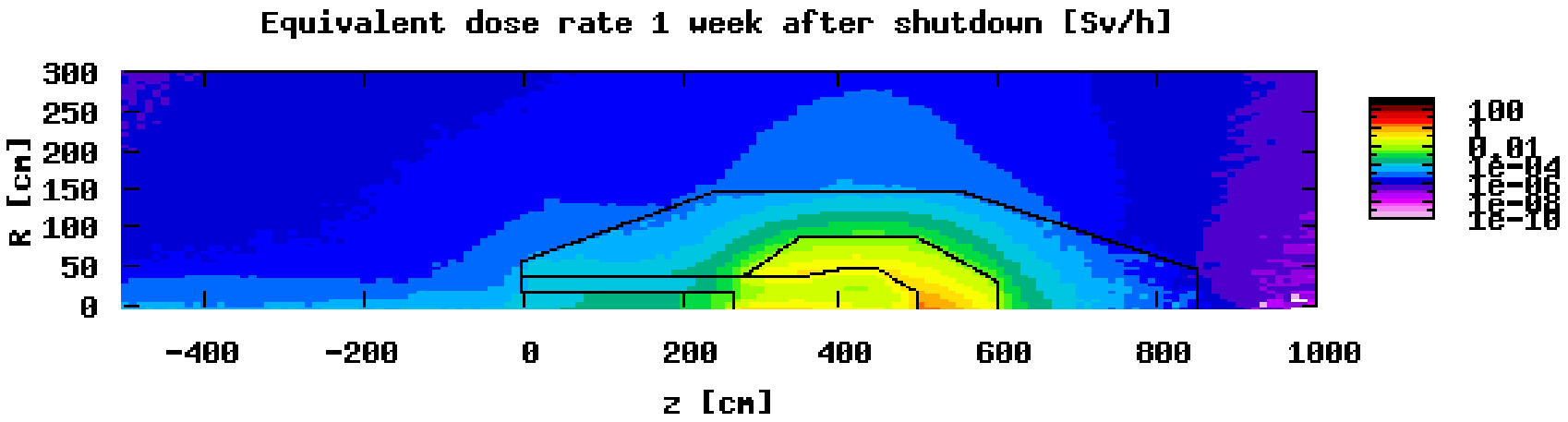


Beam dump. Prompt dose

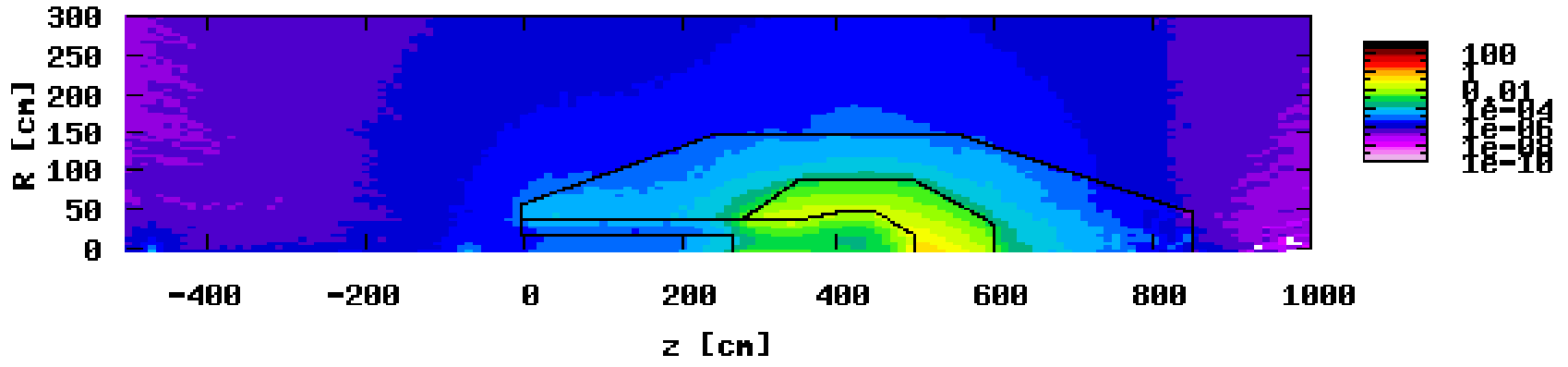


Beam dump. Equivalent dose rate

1 week



1 year



Thank you for your attention!!!