

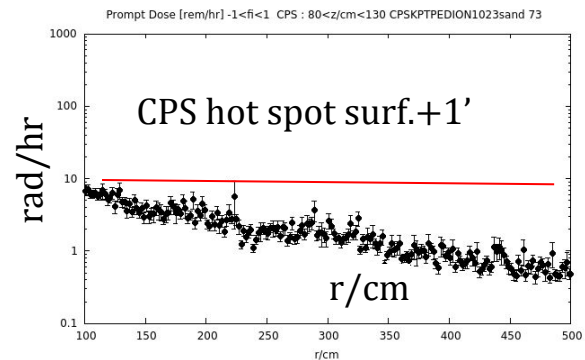
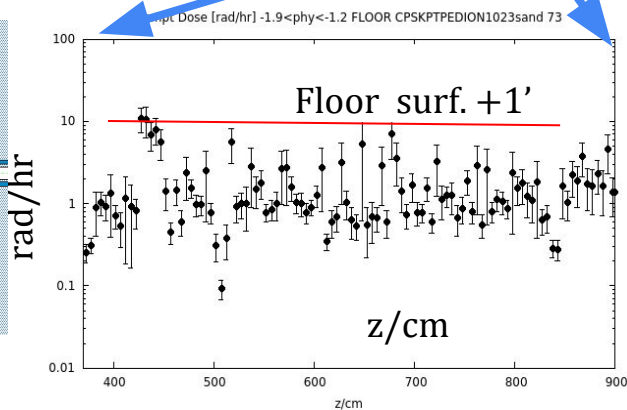
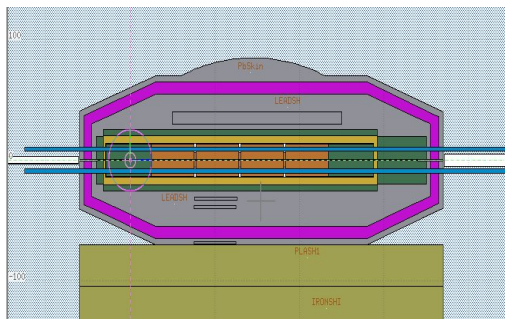
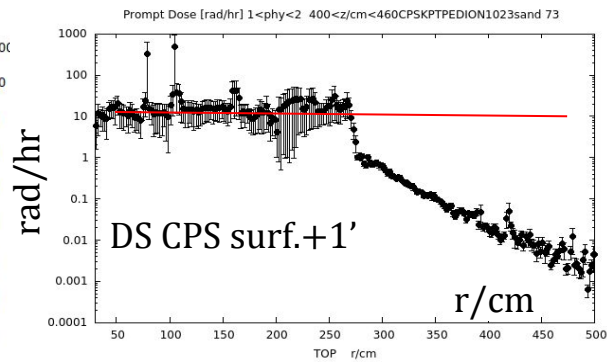
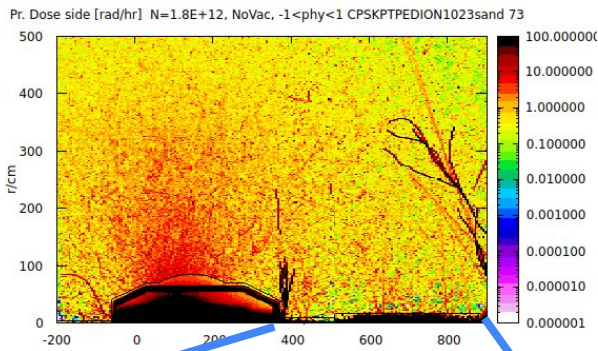
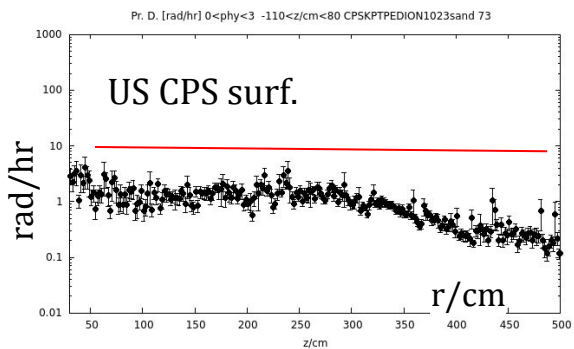
**Dose rates near CPS surface**

**and**

**Material Lifetime (LT).**

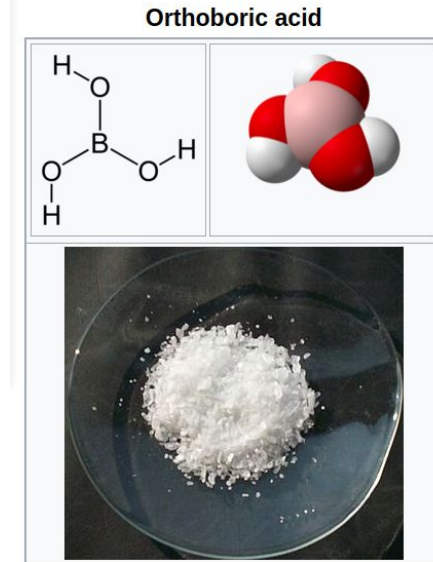
**CPS optimization.**

# Dose rates near CPS surface and Material Lifetime (LT).



# Prompt Dose Rates and Material's Lifetimes in corresponding hot spots

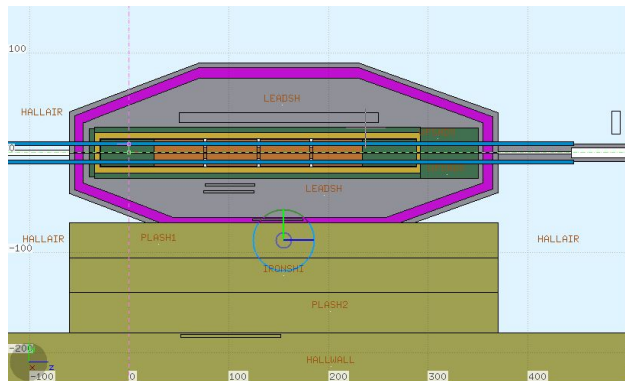
CPS Mater.	Max. Dose (unit)	Max. Dose rate (unit)	Life time (unit)	Life time (year)	Comment
SuperNG [15]	$4 \times 10^7$ (rad)	10 (rad/h)	$4 \times 10^6$ (h)	> 400	Connectors
EVA [12]	$2 \times 10^7$ (rad)	10 (rad/h)	$2 \times 10^6$ (h)	> 200	Cables
Low Den. Polyeth. [12]	$1 \times 10^7$ (rad)	10 (rad/h)	$1 \times 10^6$ (h)	> 100	Cables
Low Den. Polyeth.	$1 \times 10^7$ (rad)	$5 \times 10^3$ (rad/h)	$2 \times 10^3$ (h)	> 0.2	Shield
Alumina [13]	$10^{21}$ (n/cm <sup>2</sup> )	$5 \times 10^9$ (n/cm <sup>2</sup> /s)	$2 \times 10^{11}$ (s)	> 6000	Coil insul.
Perm. Mag. NdFeB [14]	$2 \times 10^{16}$ (n/cm <sup>2</sup> )	$6 \times 10^7$ (n/cm <sup>2</sup> /s)	$3.3 \times 10^8$ (s)	> 10	Beam Line
Kapton [7]	$10^7$ (Gy)	0.1 (Gy/s)	$10^8$ (s)	> 3	Coil insul. Line
Fiber Glass Cloth [7]	$5 \times 10^7$ (Gy)	0.1 (Gy/s)	$5 \times 10^8$ (s)	> 16	Coil insul. Line



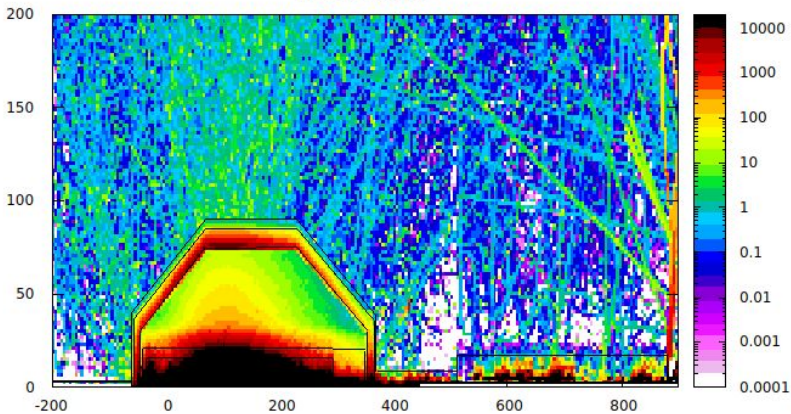
Estimated PolyEthylene LT < 1 year corresponds to tensile elongation of 50%. Much longer LT?

- Using more Tungsten results in (+Cost? +Weight ?) Pol. Eth. LT > 10 years.
- Granulated PE encapsulated in cyl./con. Metal Containers => infinite LT?
- Probably Boric Acid (BH<sub>3</sub>O<sub>3</sub>) may be used on place of PE (-CH<sub>2</sub>-) powder => infinite LT?

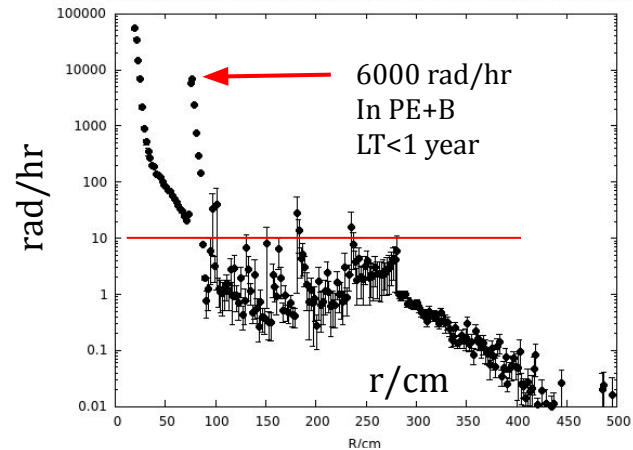
# “Optimized” CPS and PE lifetime in hot spot.



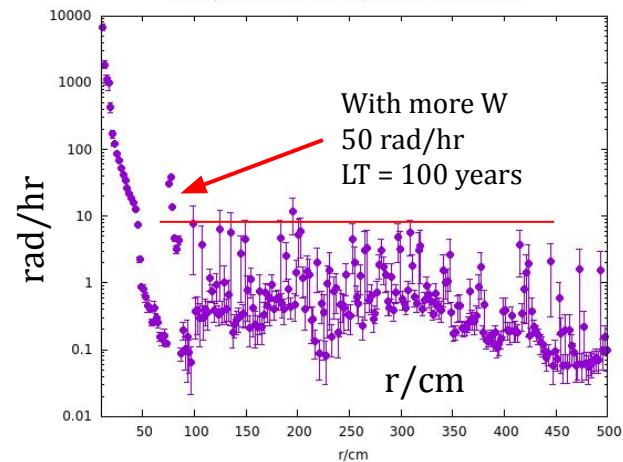
Dose CPSSHELL 73



Dose  $95 < z < 115$   $0 < \phi < 3$   $(4.E-9) * (3.125E+13) * (1.6E-10) * (1.E+5) * (3.6E+3)$  CPSSHELL 73

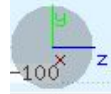
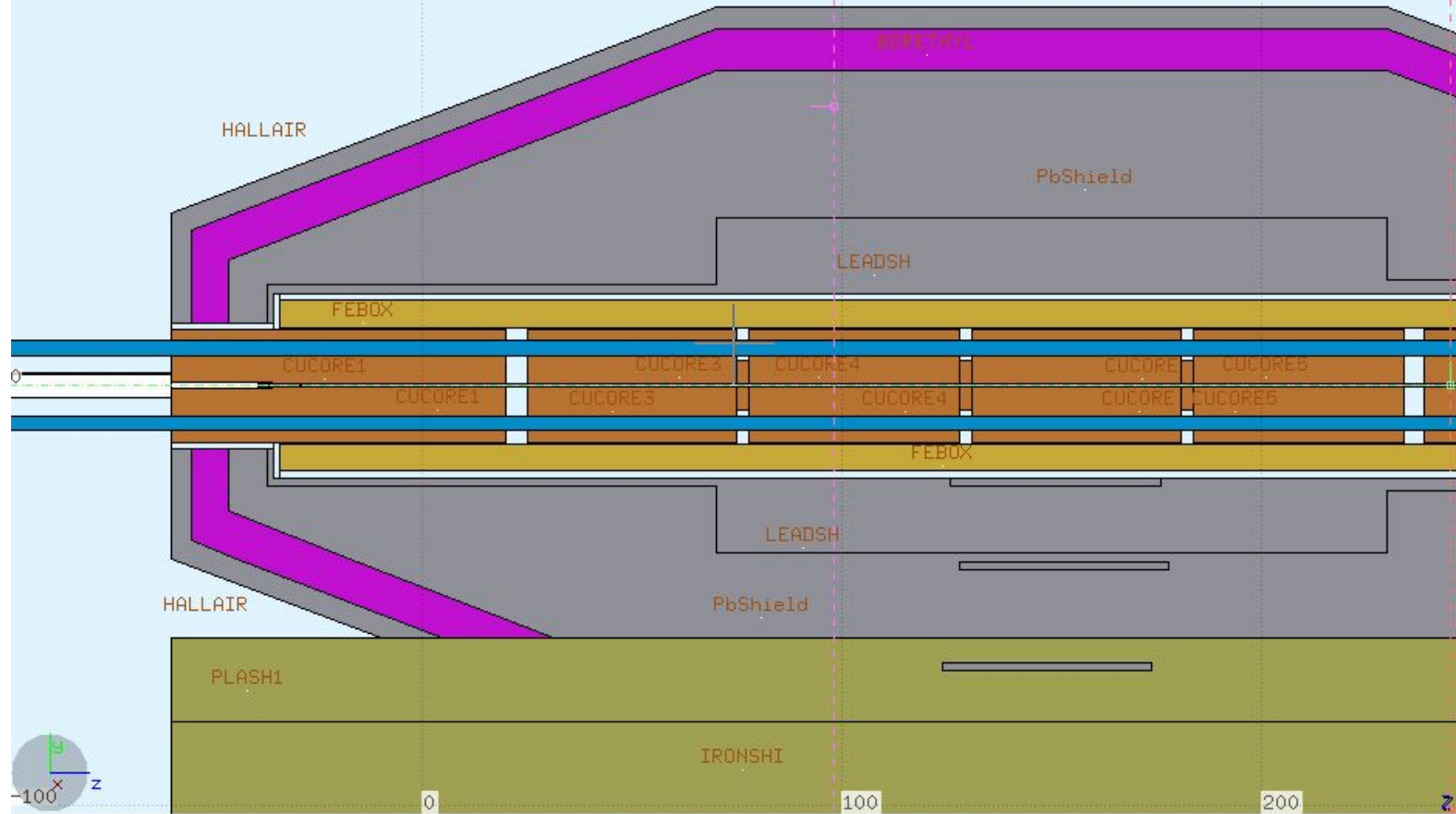


Dose profile  $85 < z < 125$   $0 < \phi < 3$  LT=CPSSHELL 73

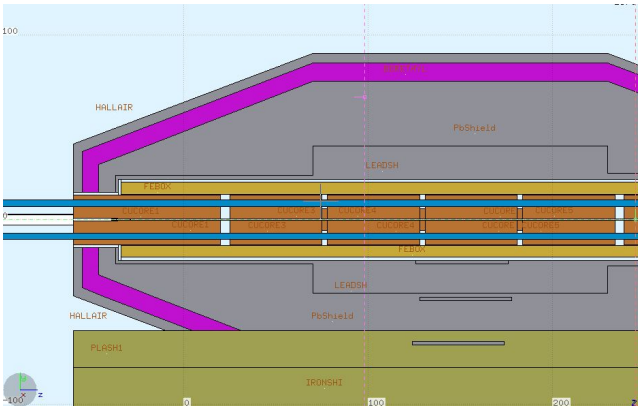


# Photon "gun". Lead on place of tungsten.

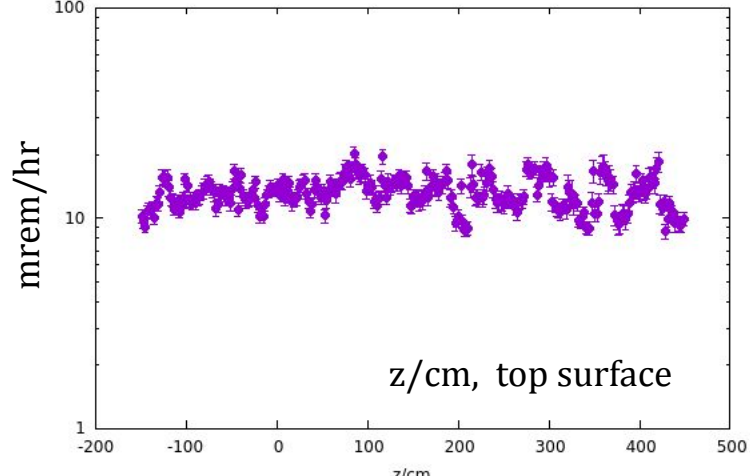
100



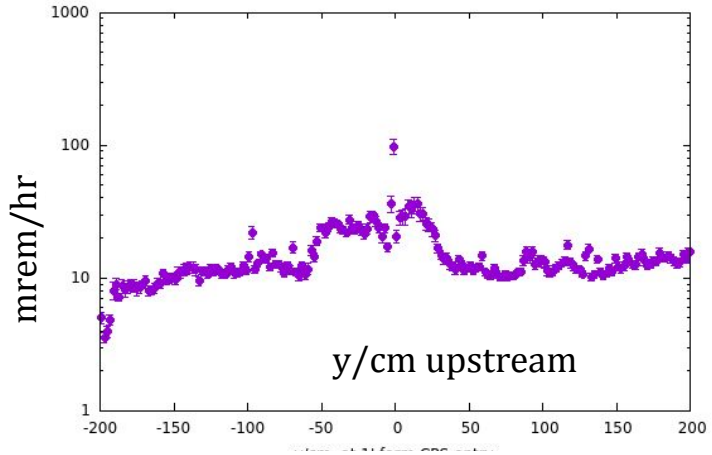
# Photon "gun". Activation after 1000+1 hr. Dose eq.



1000+1 hr Dose Eq. 0' from CPS surface 90<y/cm<120 CPSgunSHELL 23



1000+1 hr Dose Equivalent at 1' CPS enetry -100<z/cm<-70 CPSgunSHELL 23



100+1 hr Dose Eq. at CPS exit 400<z/cm<430 CPSgunSHELL 23

