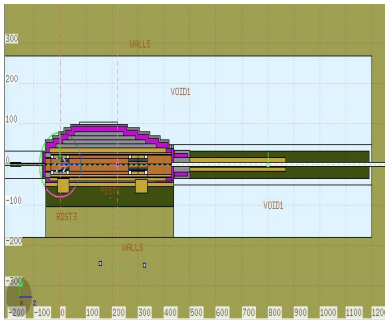
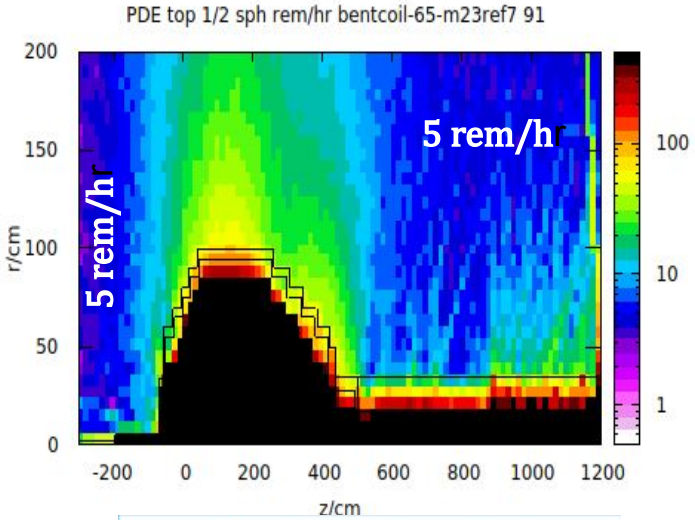
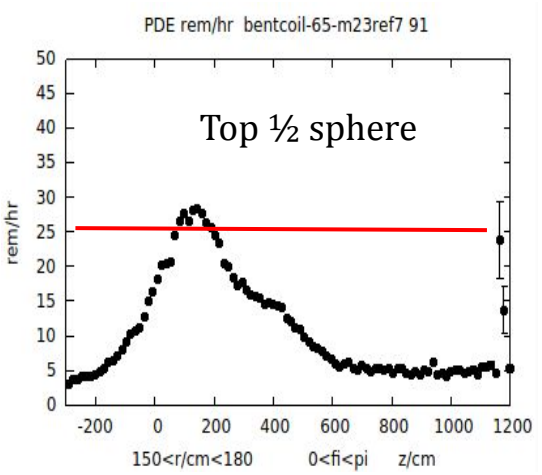
CPS meeting 06/26/23

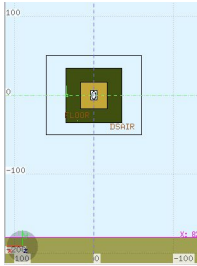
1. Shield optimization and Neutron fluence across the CPS .
2. Prompt Dose Equivalent and Activation around CPS .
3. PDE and Activation around Beam Line.
4. Round and “Stingray” channels.
5. Coil lifetime.

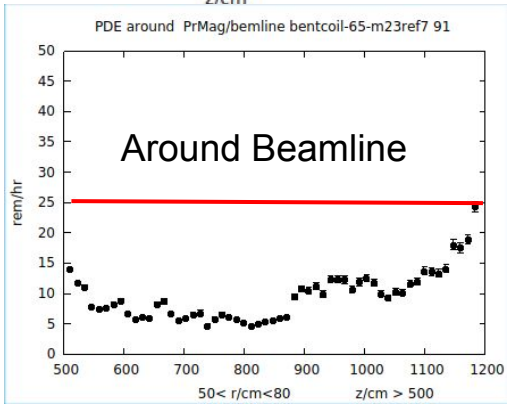
Prompt Dose Eq. around CPS and B+Concr. beam line shielding .

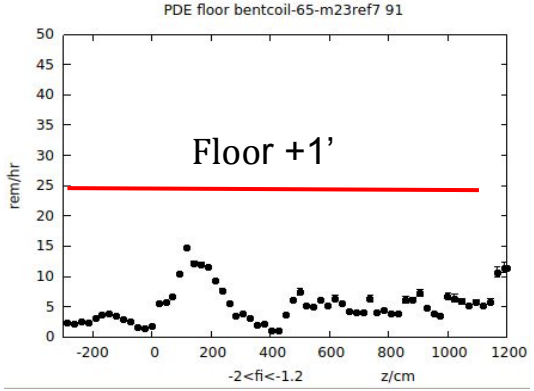






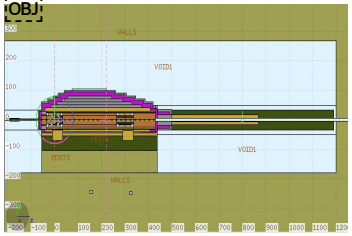


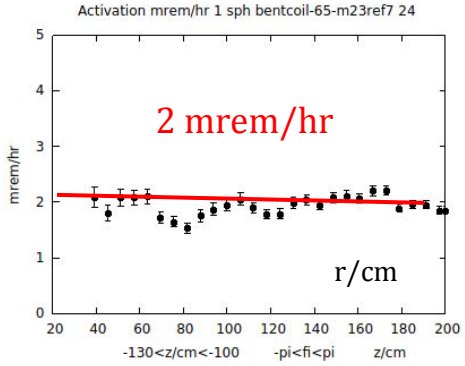


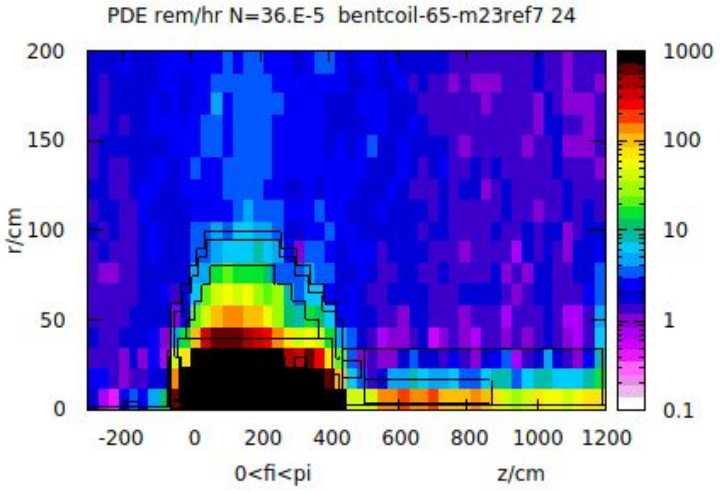


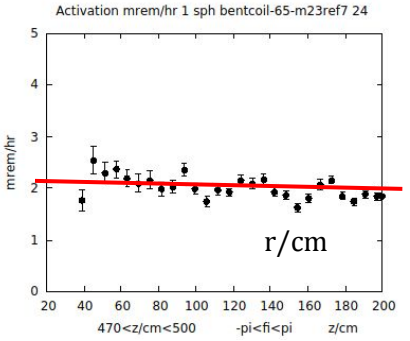
- PDE at floor level is below 15 mrem/hr

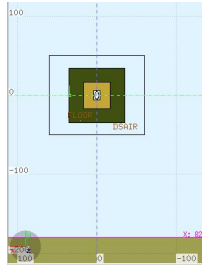
Activation 1000+1 hr. CPS with beam line shielding .

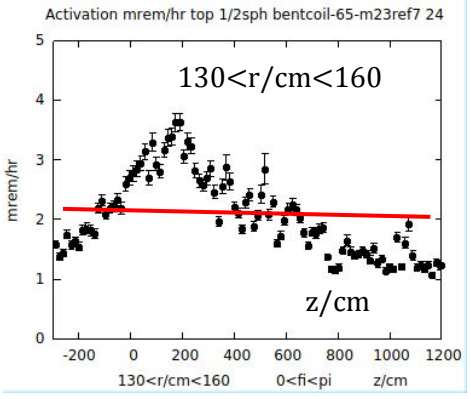


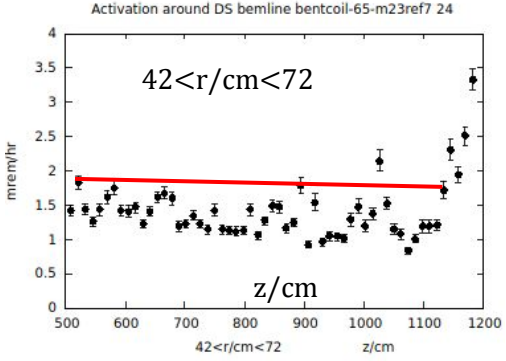






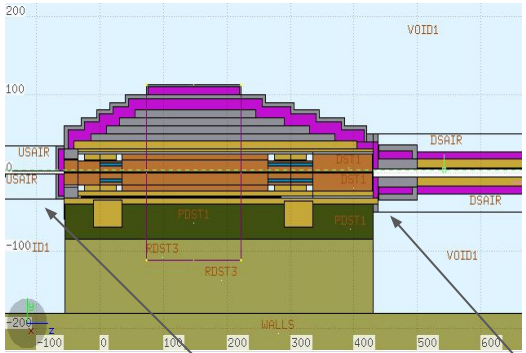


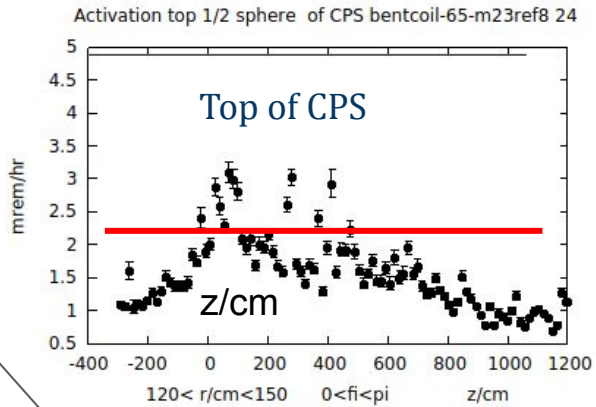


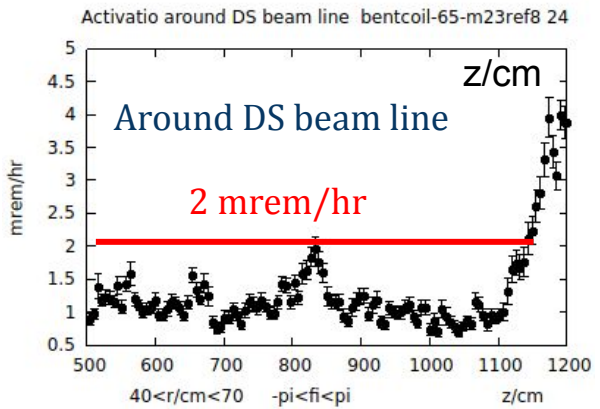


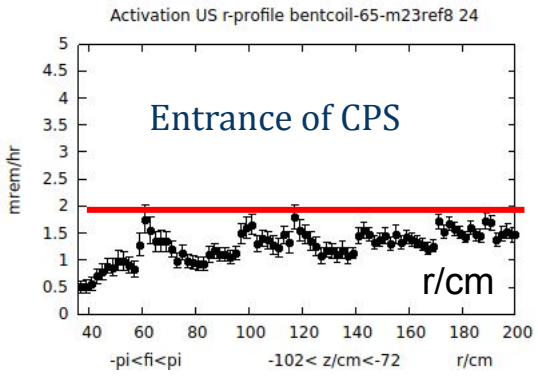
- Activation is below 3.5 mrem/hr

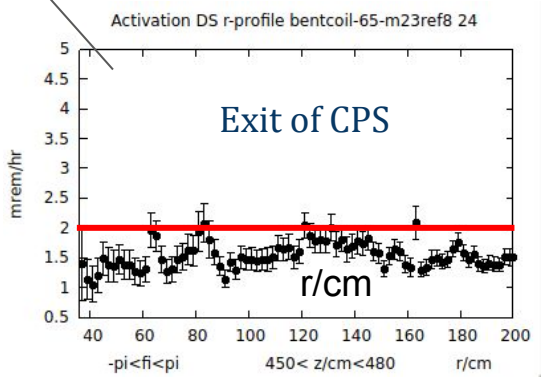
Activation.CPS with extra layer of BPE around CPS (R=112.5 cm). BPE around the beam line.

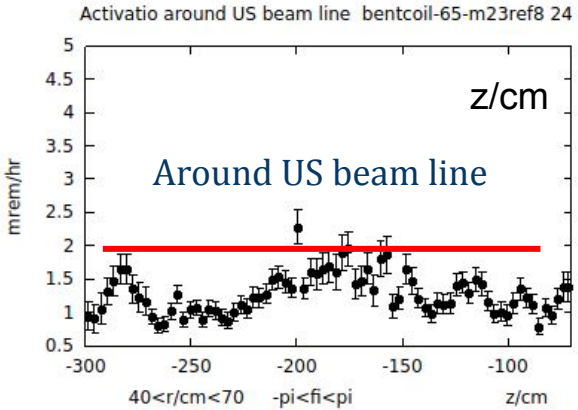






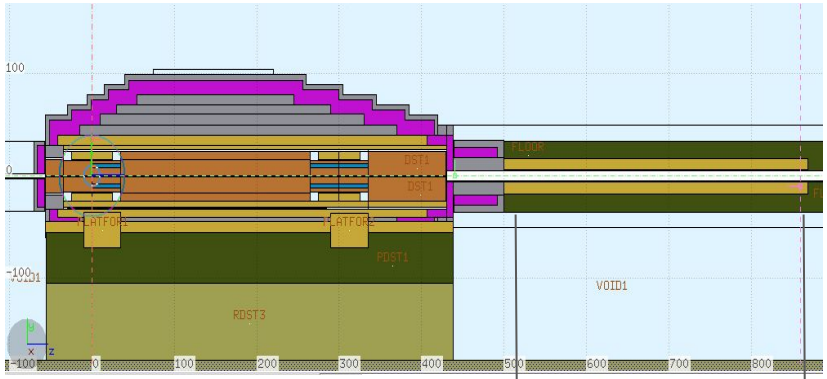


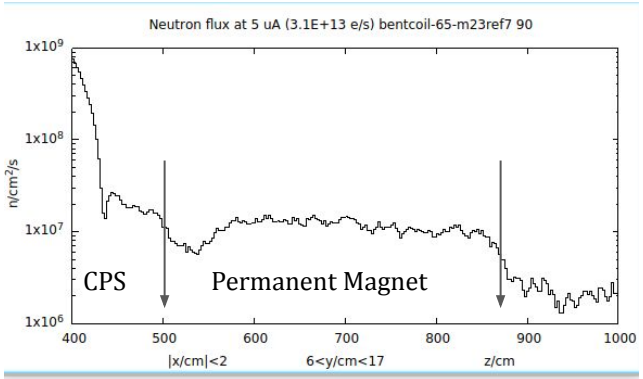


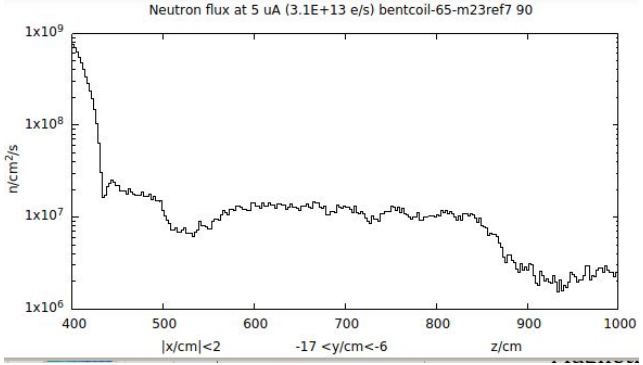


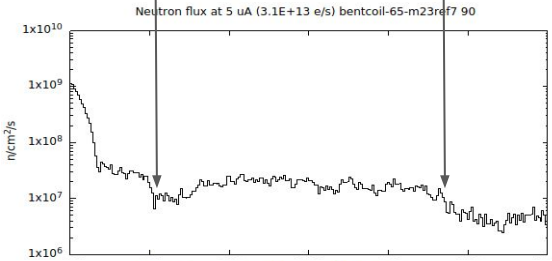
- Activation around CPS and beamline is below 2.5 mrem/hr !

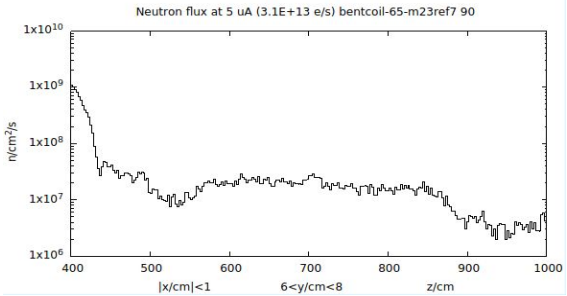
Neutron flux inside CPS (z/cm < 440) is more than 100 times higher and continue to climb!







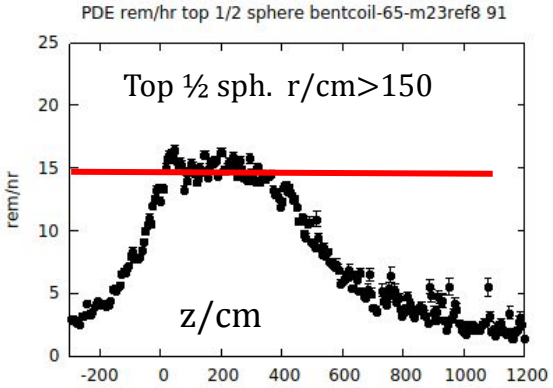


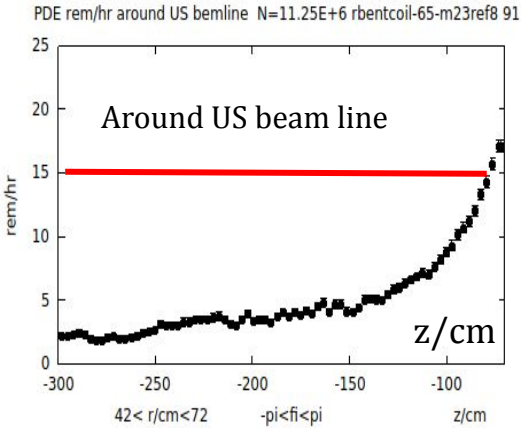


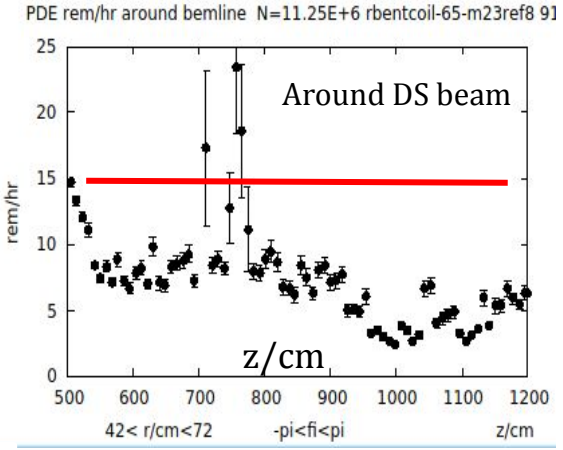
<u>Outside CPS</u>
LT=2E16/2.E7
=1.E9 s=
=30 years,

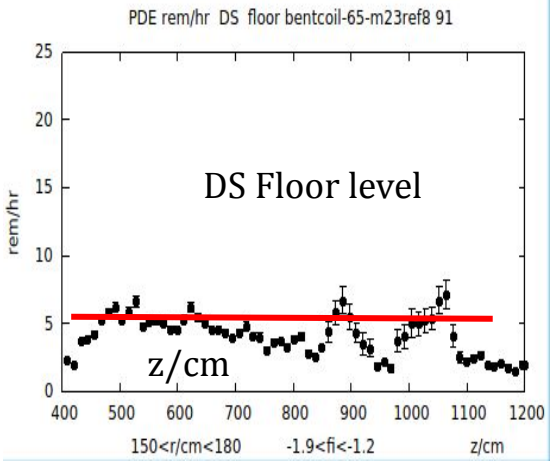
<u>Inside CPS</u>
LT<2/E16/1.E+9=
2.E7 s = 0.5 year.

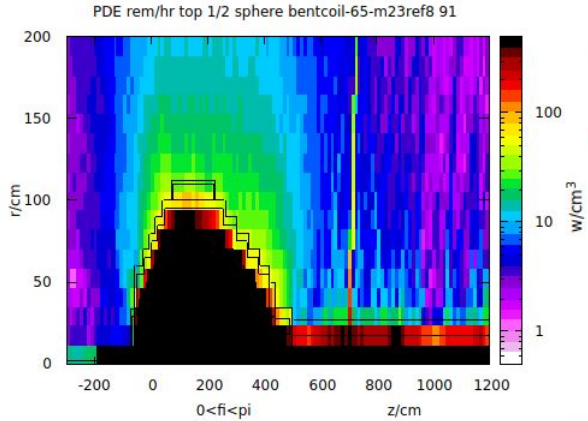
PDE. CPS with extra layer of BPE around CPS (R=112.5 cm). BPE around the beam line.

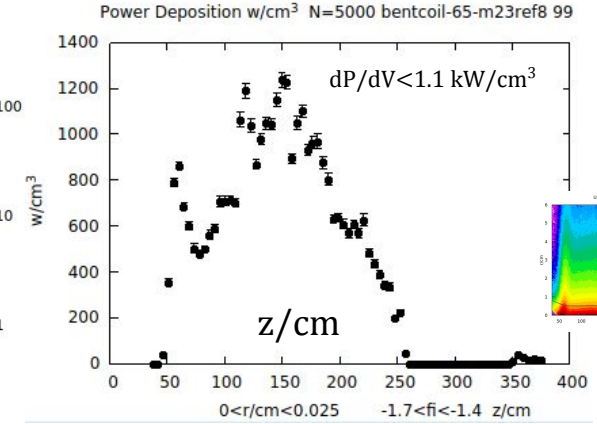






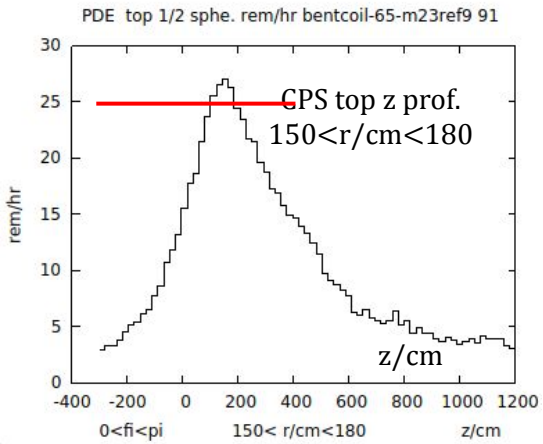


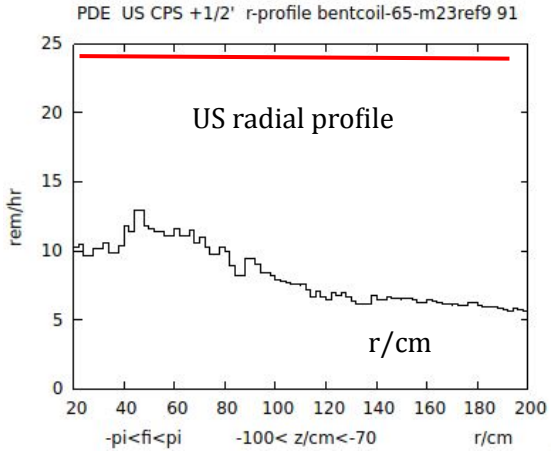


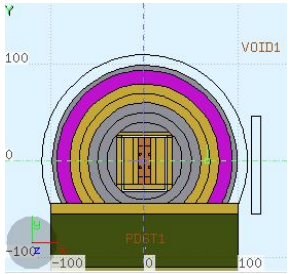


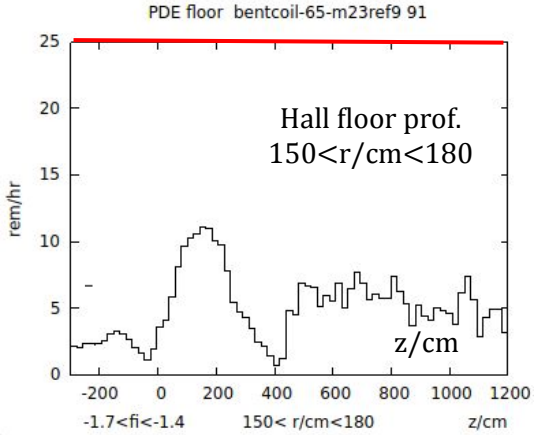
- PDE at floor level is below 7 rem/hr. dP/dV<1.2 kW/qcm.

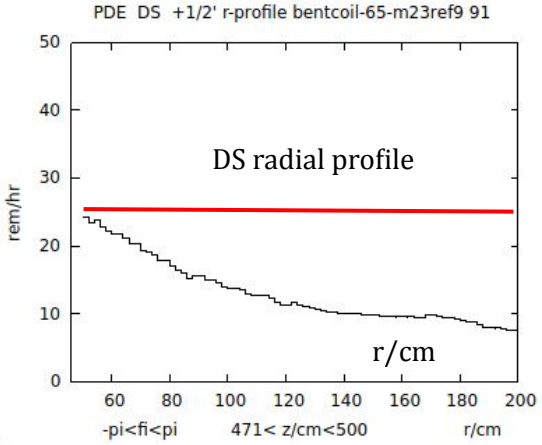
PDE . CPS with longer "stingray" channel. CPS R < 99 cm. B=0.9 B_n. Fe: core and 2 shield layers.

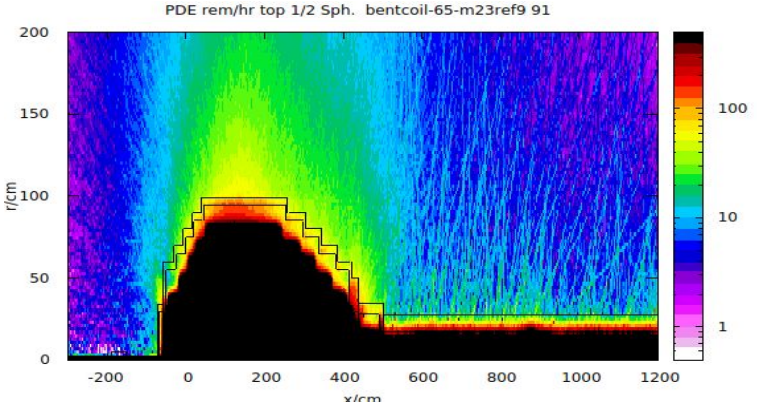






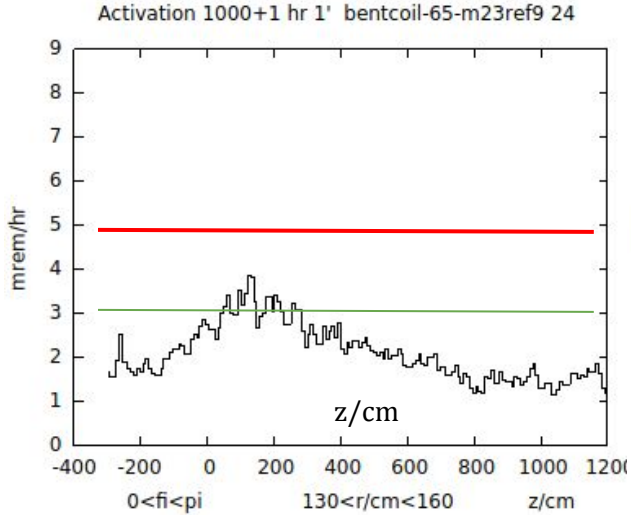


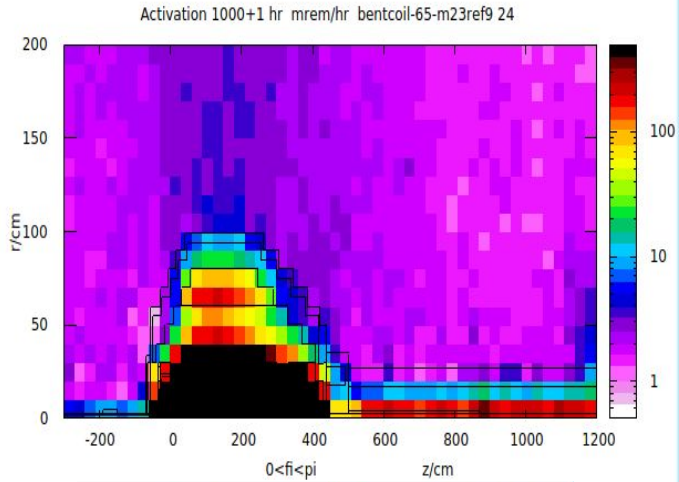


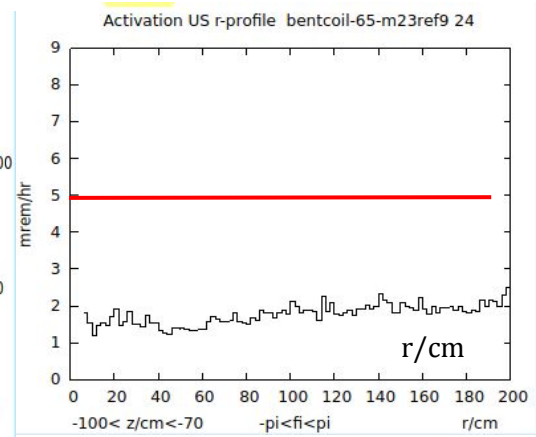


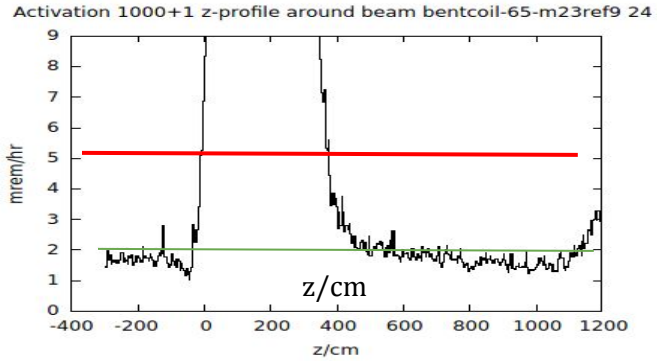
- PDE at floor < 7 rem/hr meets limits of PAC48.

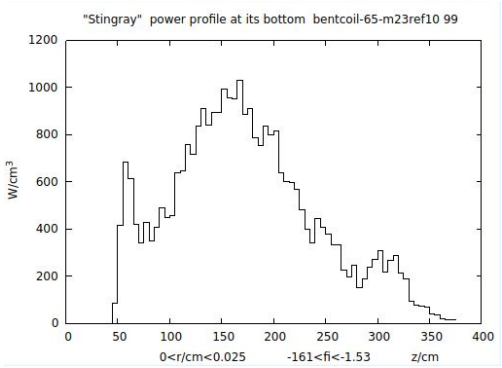
Activation. CPS with longer "stingray" channel. CPS R < 99 cm. B=0.9 B_n. Fe: core and 2 shield layers.

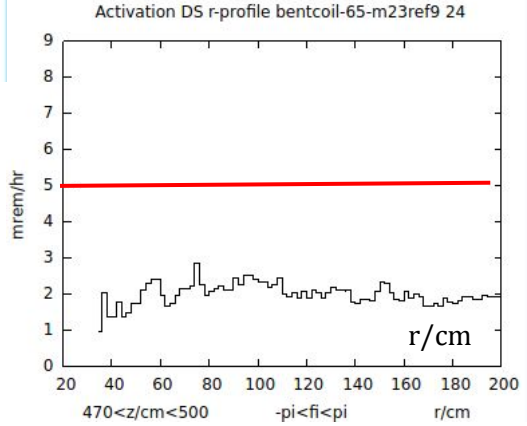






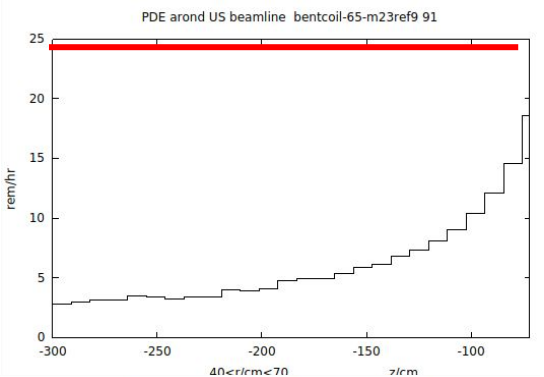


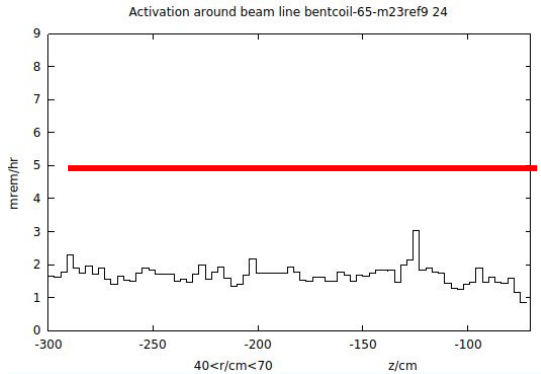


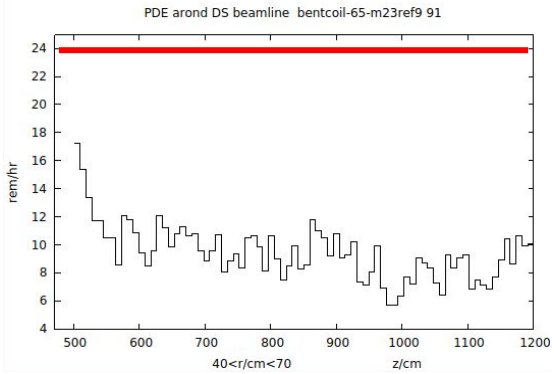


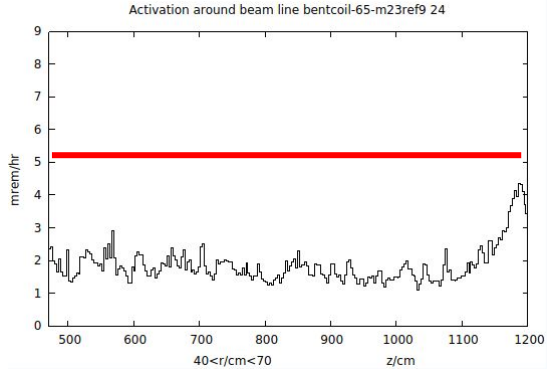
- Activation < 3 mrem/hr meets the limits of PAC48.
- Power deposition (!) dP/dV <1000 W/cm^3

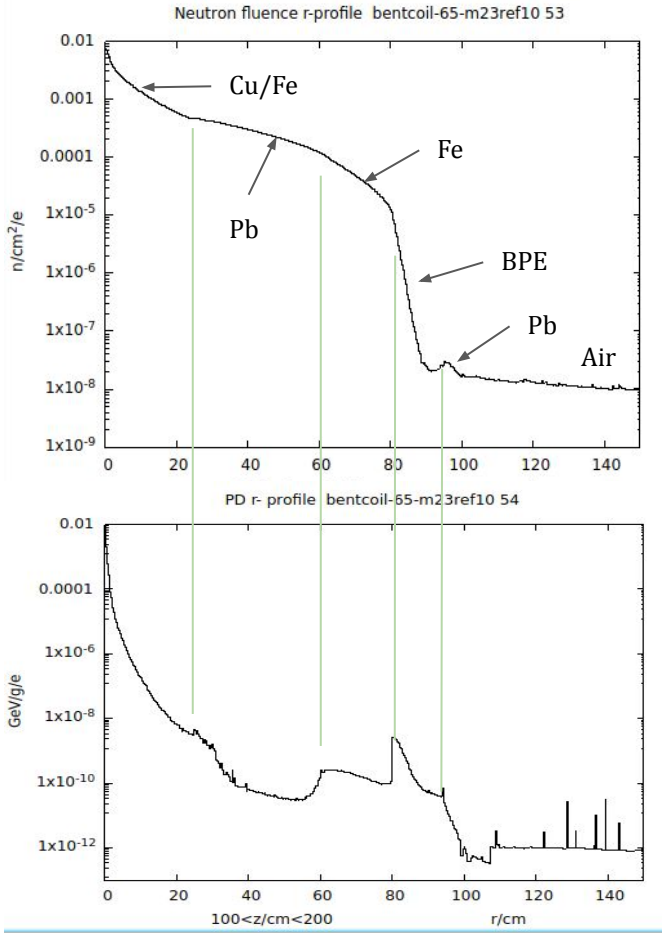
PDE and Activation around beam line. CPS R < 99 cm. B=0.9 B_n. Fe shield and neutron fluence.





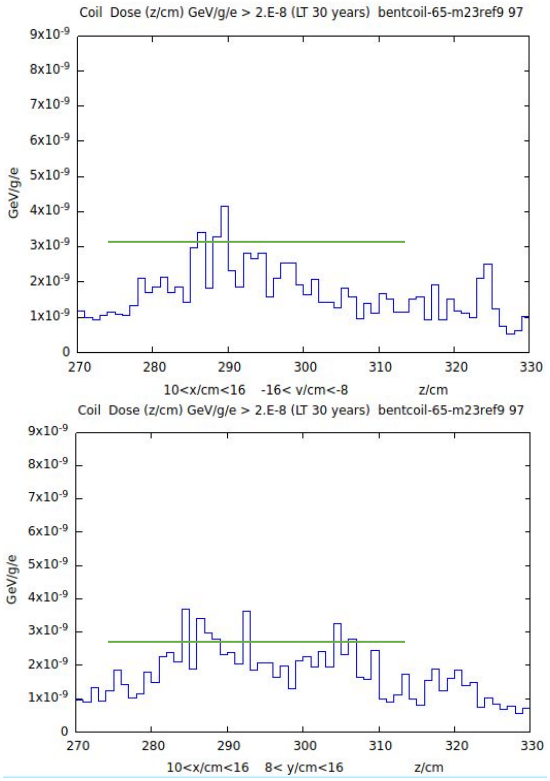


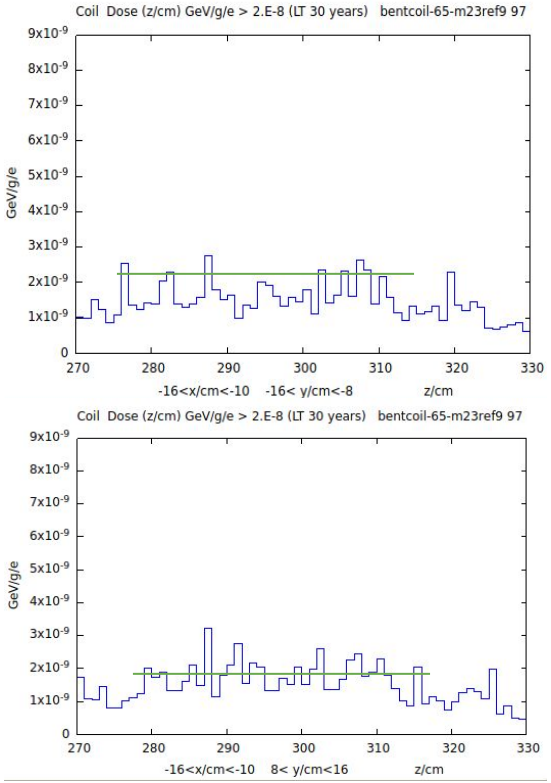


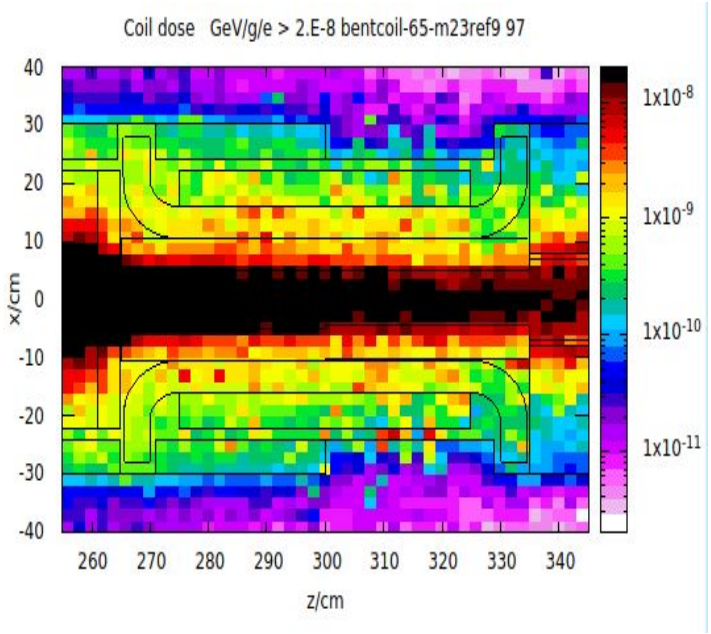


- Neutron related dose around CPS **may be reduced** optimizing Pb/Fe composition of shield layers.
- PDE and Activation around beam line allows **safe work of electronics and humans**.

Coil LT > 200 years. "Stingray" channel. CPS R < 99 cm. B=0.9 B_n. Fe: core and 2 shield layers.







- Dose 2.E-8 GeV/g/e translate to LT=30 yr => Dose 3.E-9 GeV/g/e translate to LT=200 years.
- Practically infinite LT of DS coils.

1. CPS meets radiological requirements of PAC48:
2. Activation $<$ 3 mrem/hr.
3. Prompt Dose Eq. at floor level $<$ 5 rem/hr (25 rem/hr - PAC 48).
4. Activation around beam line $<$ 2 mrem/hr.
5. Prompt dose around beam line $<$ 15 rem/hr.
6. Absorber channel design excludes risks of overheating; no vertical surfaces.
7. CPS diameter =198 cm (with 2 Fe layers) may be further reduced.
8. May be vacuumized (with round beam channel).