



# HIPS 2017 Workshop follow-up meeting(s)

❑ First follow-up discussion was on Tuesday 28 March 2017 at JLab

- Hosted by Thia who invited representatives of the various efforts: Bogdan, Gabriel, Donal, Dustin, Pavel, Igor (KL), Tanja (NPS)
- Defined MC benchmarks to ensure that work is cross-effort compatible and further discussed the one/best source approach

❑ Next discussion scheduled for Thursday 20 April 2017

# HIPS Simulation - Benchmarks

- ❑ Pavel defined experimental run conditions satisfying radiological protection requirements

Beam energy: 11.5 GeV

Beam current: 2.6 microA (Beam Power = 30 kW)

Run time: 1000 hours

The radiation dose rate parameters must stay within limits typical for a high current experiment in the Halls:

dose rates in the Hall should be under several rem/h at 10 m from the device;

dose rates at the boundary should be under 1 microrem/h during the run;

dose rates outside the device envelope at a foot distance from the device should be under several mrem/h after one hour following the end of the 1000 hour run.

- ❑ Software tools available for simulations

The tools available for the prompt dose calculations around the device are GEANT3, Geant4, and FLUKA.

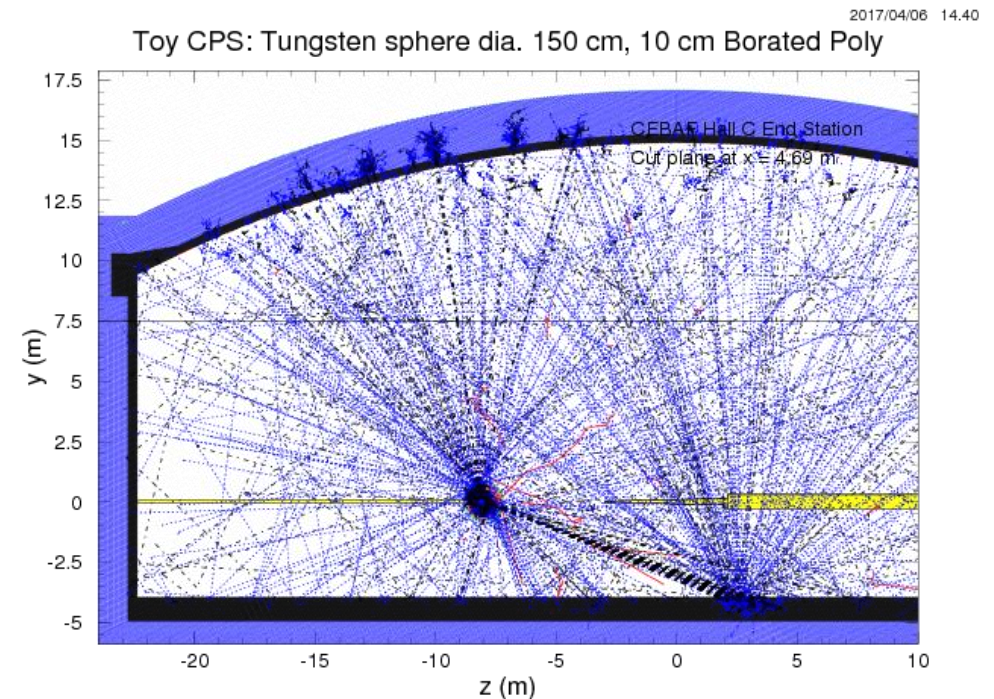
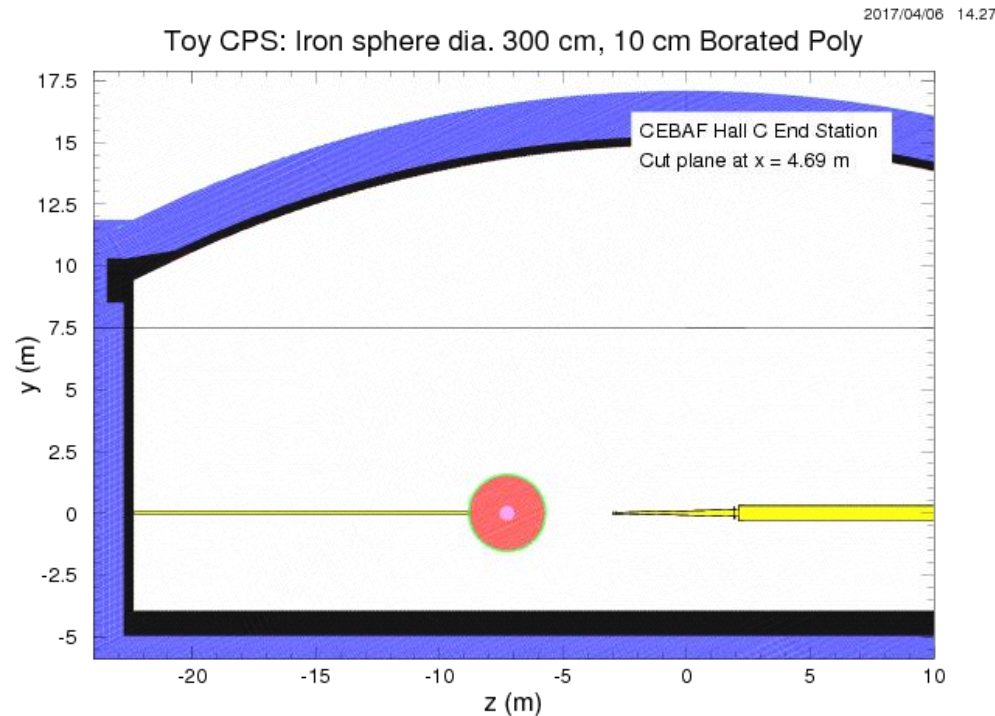
For the activation evaluation problem only FLUKA is available, but different independent calculations by different groups are possible and will be useful.

For the dose rates at the boundary we only have one tool, based on the GEANT3 package that we typically use at RadCon for the Radiation Budget calcs. FLUKA-based Rad.Budget tool is under development, but not ready yet.

# HIPS Simulations – two simple geometries to start



- 1) "Iron" (density  $7.8 \text{ g/cm}^3$ ) sphere with the diameter of 300 cm, centered at (0,0,0), with the beam origin at (0, 0, -30 cm), to take into account, to some extent, the development of the cascade along 'z', and the need of more shielding in forward (z) direction.
- 2) a similar sphere but made of "Tungsten powder" (density of  $15.6 \text{ g/cm}^3$ ) with the diameter 150 cm, centered at (0,0,0), and with the beam origin at (0, 0, -15 cm)



# HIPS Simulations – first estimates

❑ Pavel's results using his DINREG/GEANT3 simulation (shown here as an example)

Setup / Score	Only the metal sphere shielding Dose rates in rem/h at 90 degrees 3 m from the beam	Including 10 cm outer Borated Poly layer Dose rates in rem/h at 90 degrees 3 m from the beam	Dose rate estimate in microrem/h RBM-3 Boundary position
Iron 7.8 g/cm <sup>3</sup> , 300 cm dia sphere 11.5 GeV, 30 kW beam starting inside, 30 cm upstream from the center	neutrons: 146.0 gamma: 0.44 total: 146.4	neutrons: 0.8 gamma: 2.8 total: 3.6	neutrons: 0.19 gamma: 0.05 total: 0.24
Tungsten 15.6 g/cm <sup>3</sup> , 150 cm dia sphere 11.5 GeV, 30 kW beam starting inside, 15 cm upstream from the center	neutrons: 13.0 gamma: 0.06 total: 13.1	neutrons: 2.7 gamma: 0.003 total: 2.7	neutrons: 1.9 gamma: 0.5 total: 2.4

# HIPS – upcoming NPS proposals



- ☐ KLong

- ☐ TCS with transverse target

- ☐ Polarized WACS