Status of MDI Studies of Backgrounds in a Muon Collider Detector

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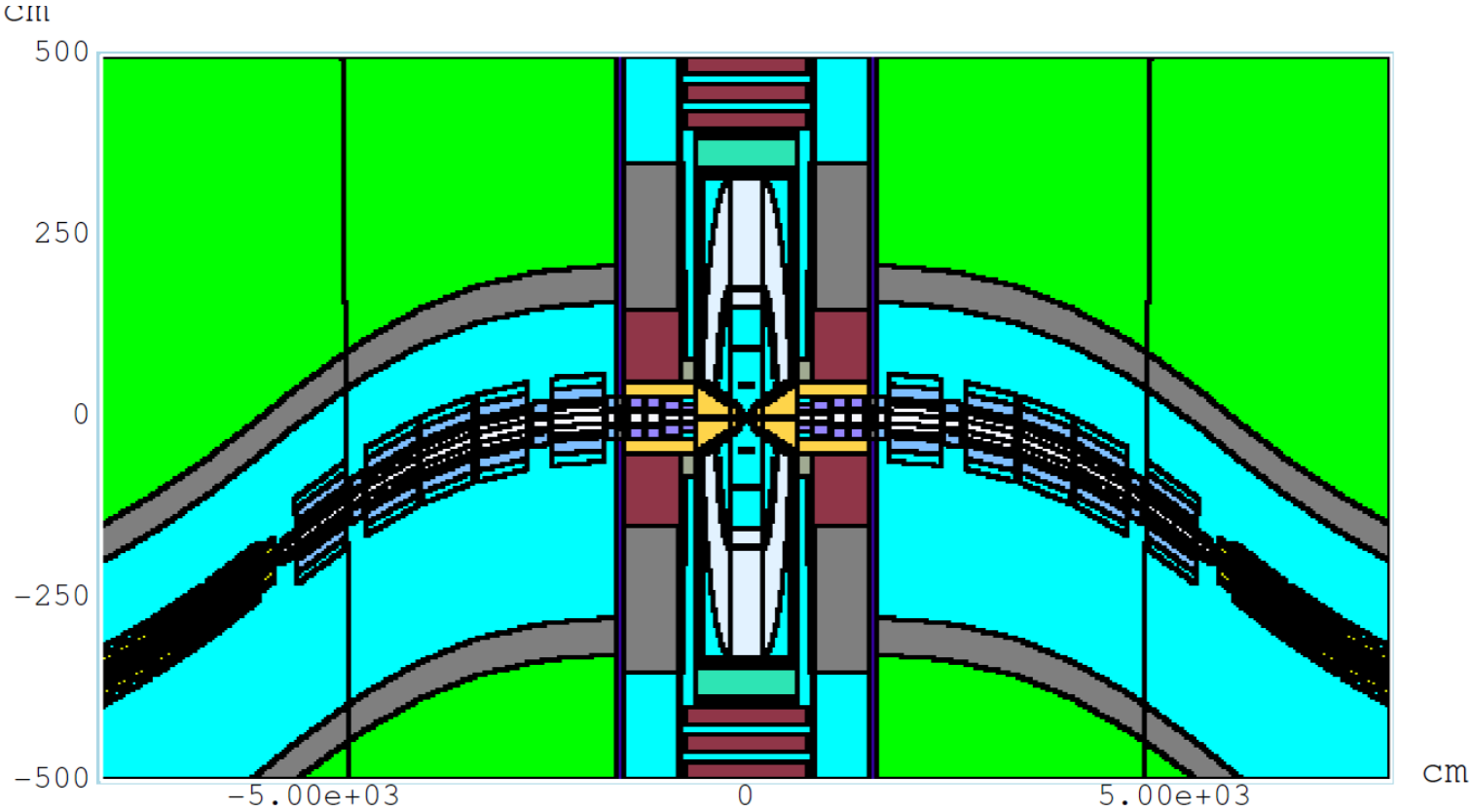
OUTLINE

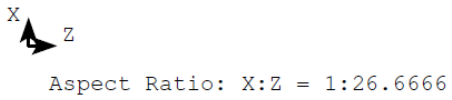
- MARS15 Modeling: IR, MDI and Detector
- Shielding Cone
- Minimal Cone Source Term for Detector Group
- Optimized Cone Runs

MARS15 Modeling (a lot of work by Vadim)

- Updated IR lattice with magnet interconnect constraints fulfilled and 5σ 10-cm tungsten masks between quads.
- Refined geometry of MDI and 4th concept ILC detector with B_z=3.5 T, with shielding and BCH_2 liners wherever needed.
- Tungsten nozzle starting at ±6cm from IP with R=1 cm at this z, BCH_2 shell (re-optimized). Variation of its outer angle (6, 10, 15 and 20 degrees). Optimization of its opening shape.
- 750-GeV bunch of 2×10^{12} μ^- approaching IP is forced to decay at -10 to 200 m at 4.28×10^5 per meter rate; two-beam mode implemented. To speed up calculations, some optimizations were done with z_{max} = 75 m rather than 200 m.
- Conceptual design of open midplane dipoles and a family of quads fulfilling IR constraints; their realistic geometry and magnetic field maps implemented into MARS model.
- Files generated for particles entering detector components (V1).

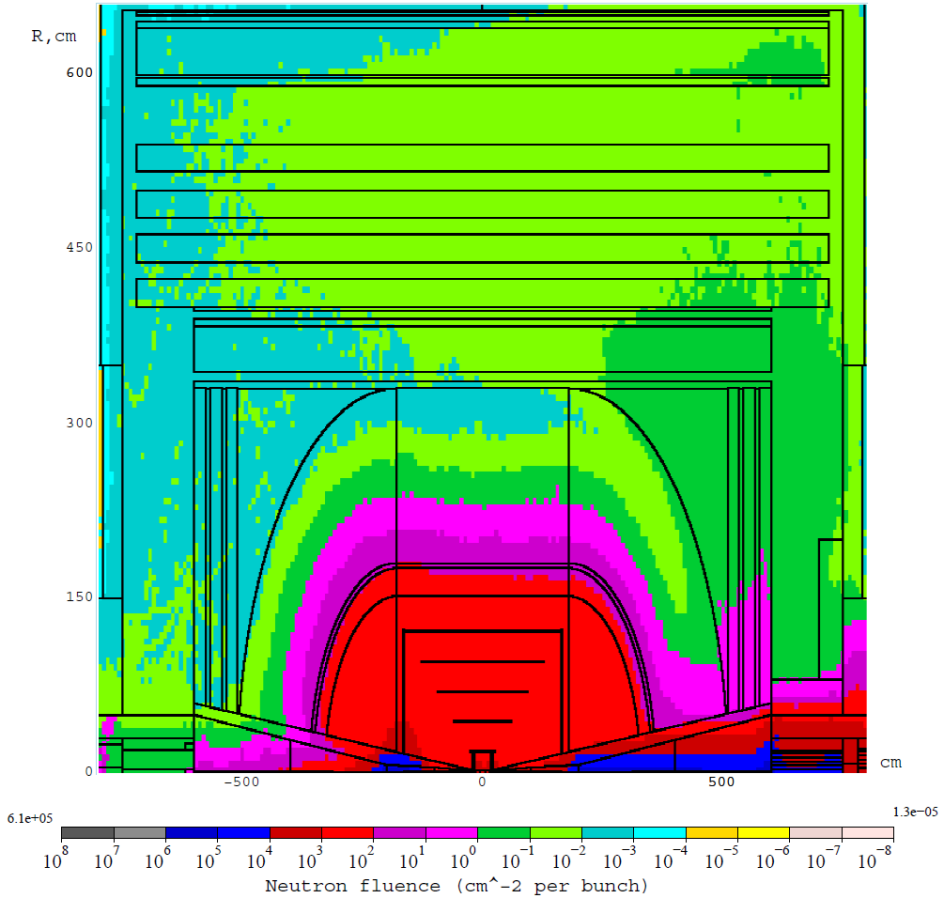
IR, MDI and Detector in MARS15

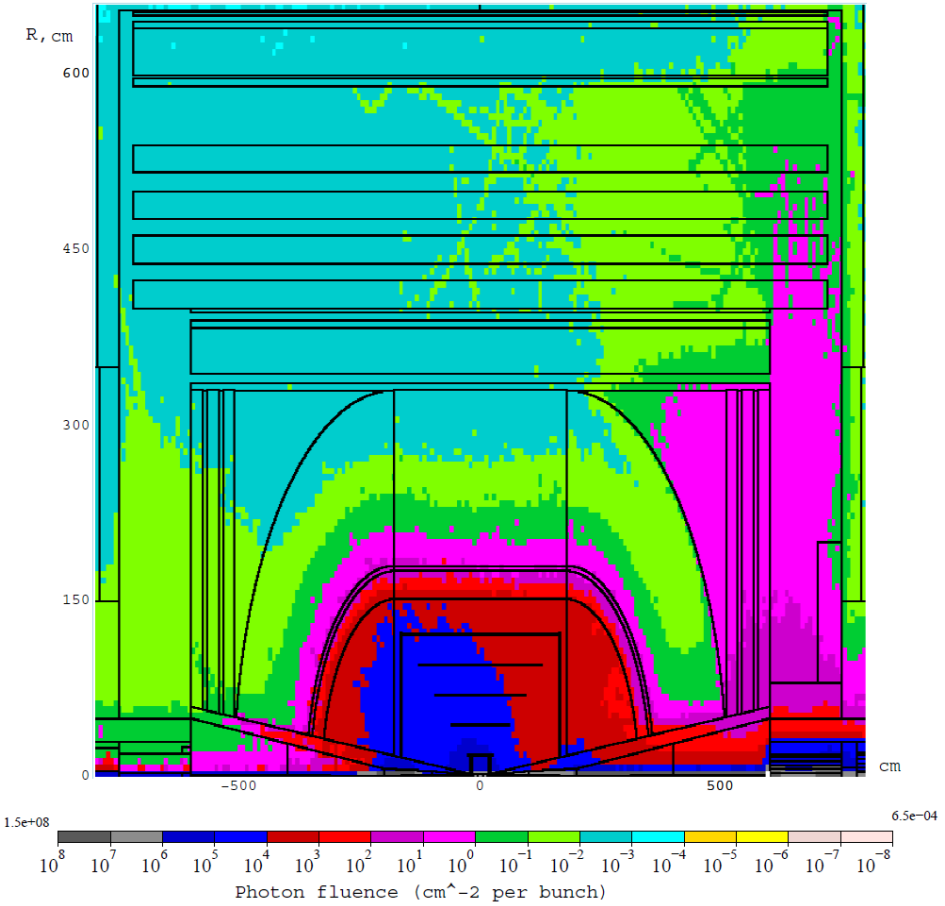




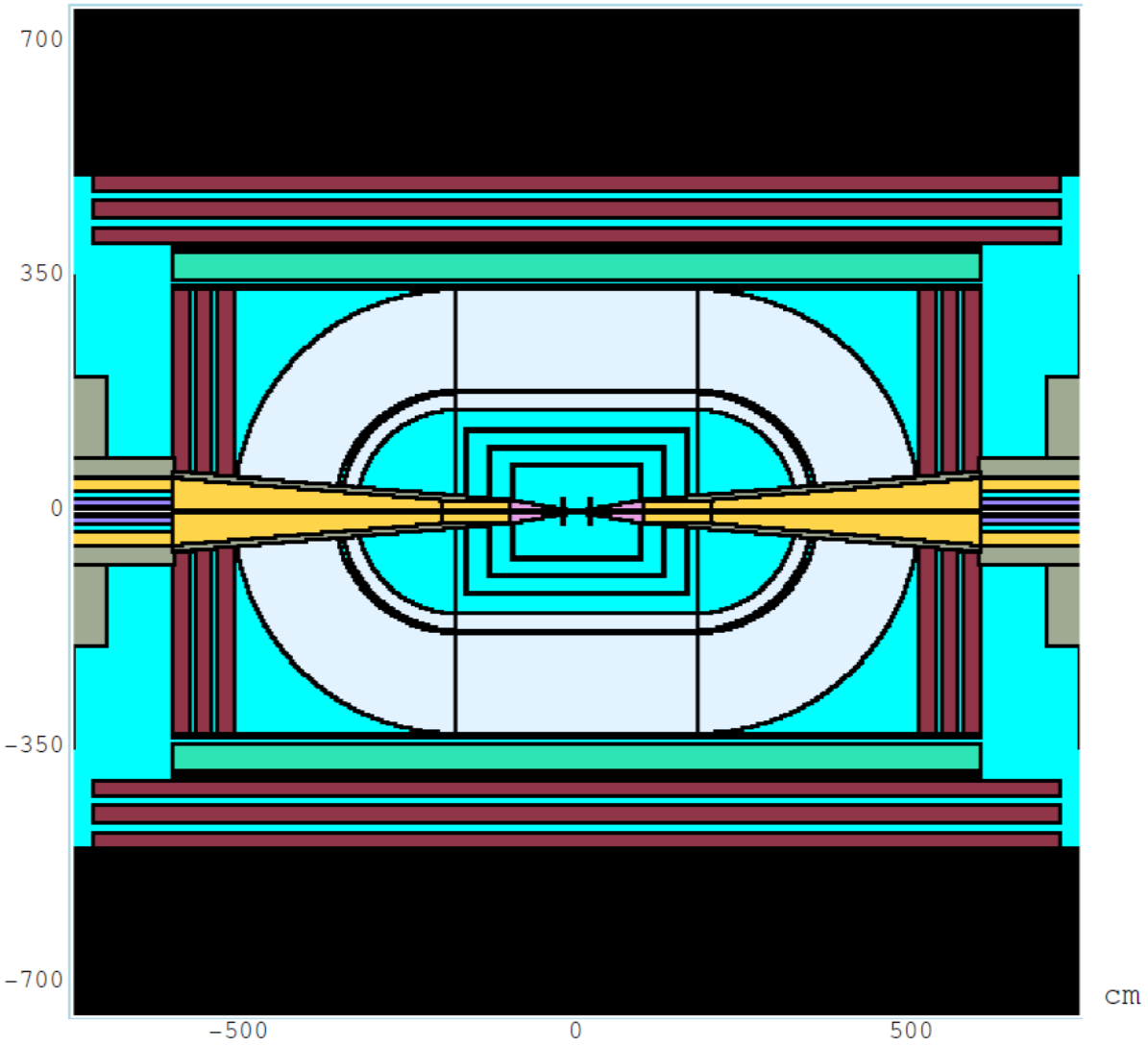
X:Z = 1:27

Neutron and Photon Fluence (January 2010)

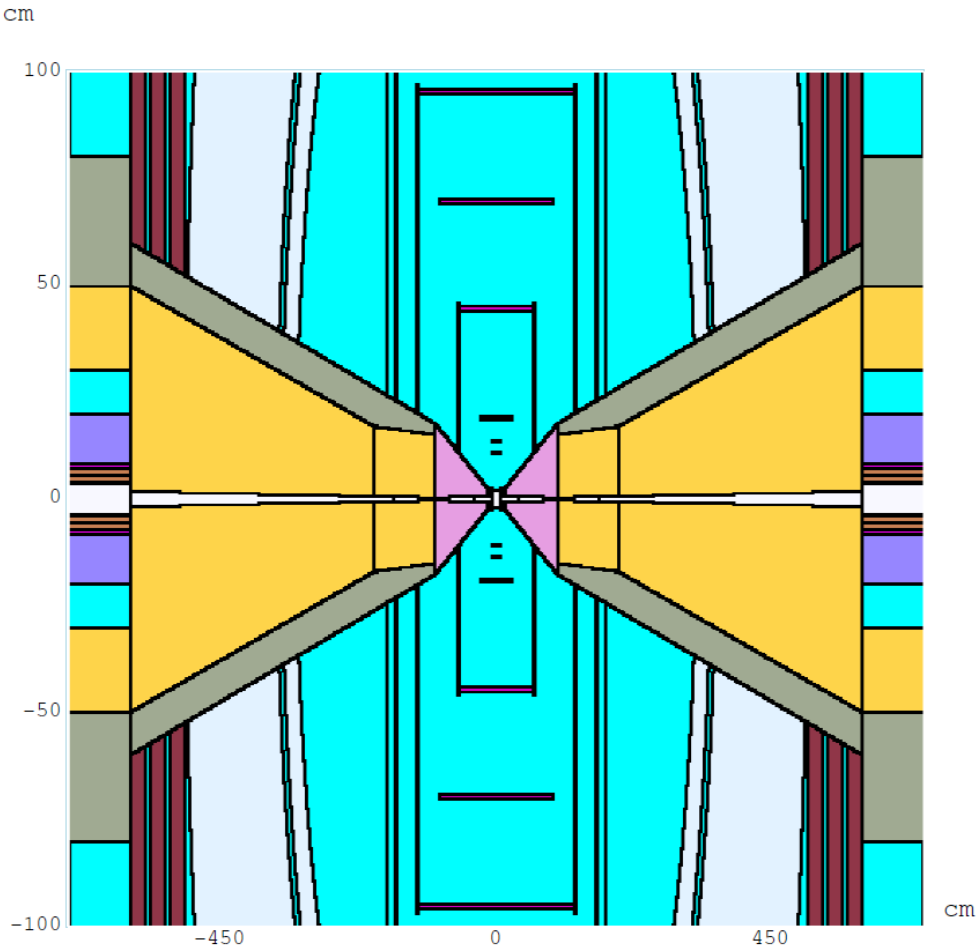




4th Concept Detector in MARS15

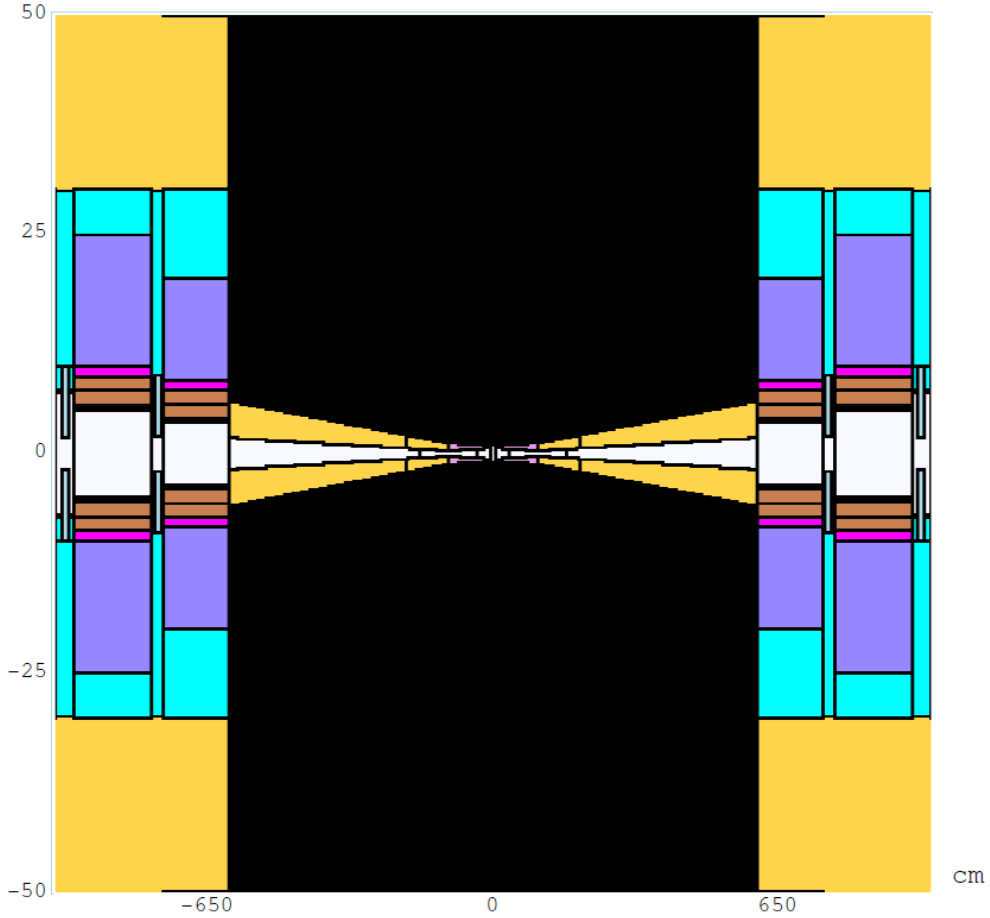


Optimized Cone (10 – 5 degree)



X:Z = 1:7

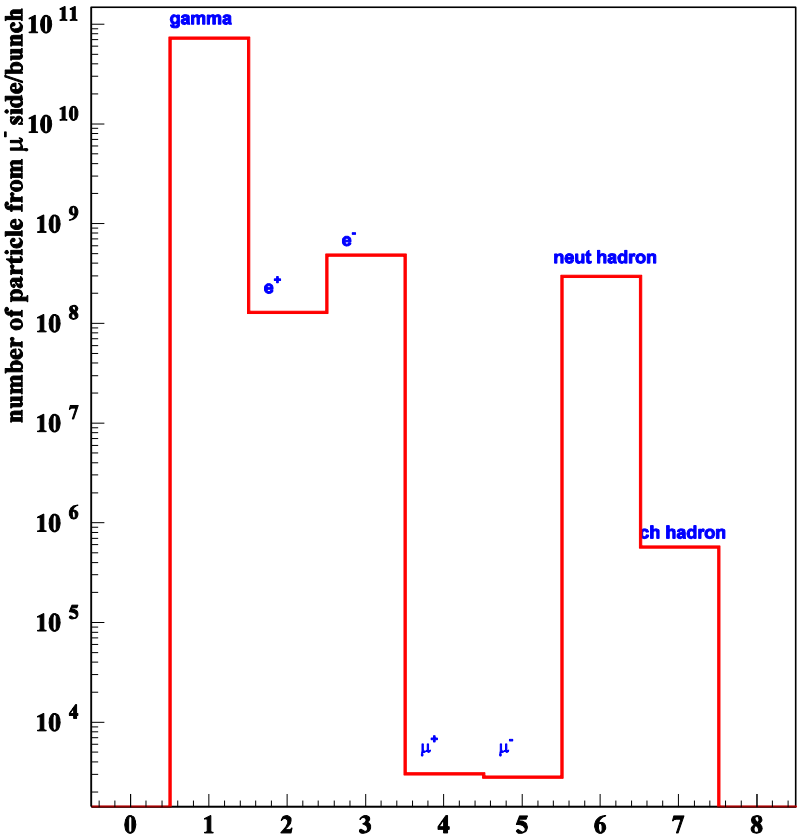
Minimal (6-deg) Cone Black Hole (V1)

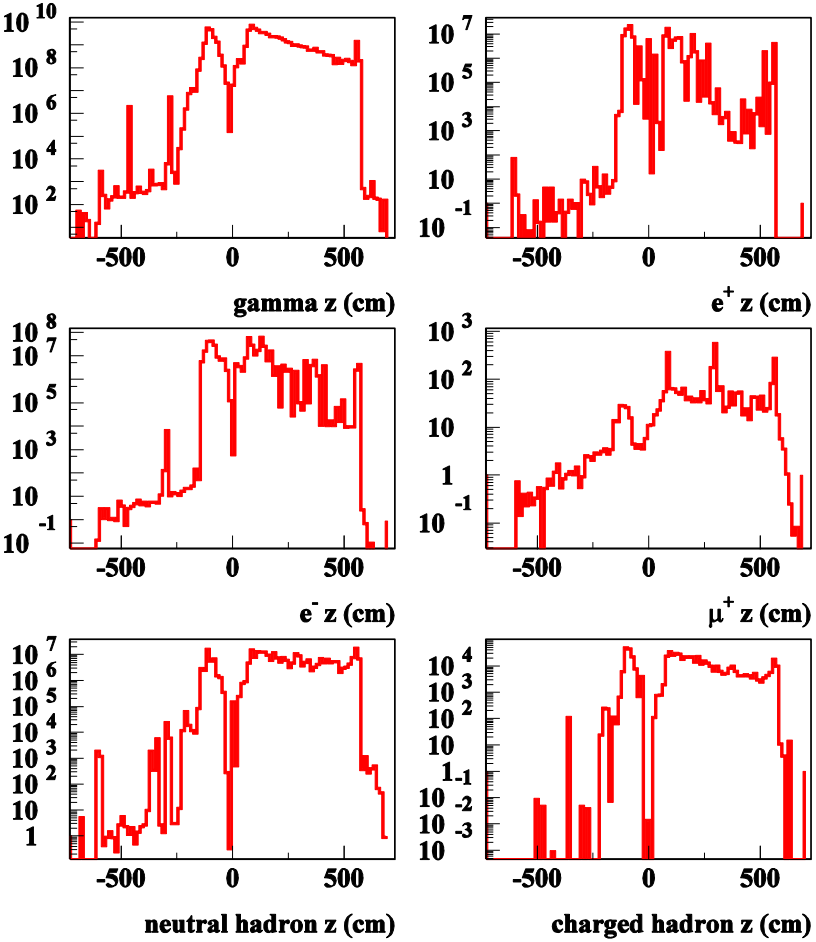


File of 0.78M particles (for 1 M decays) entering black hole (V1) generated with MARS15 for detector group (April 29, 2010) for fast Monte-Carlo in detector

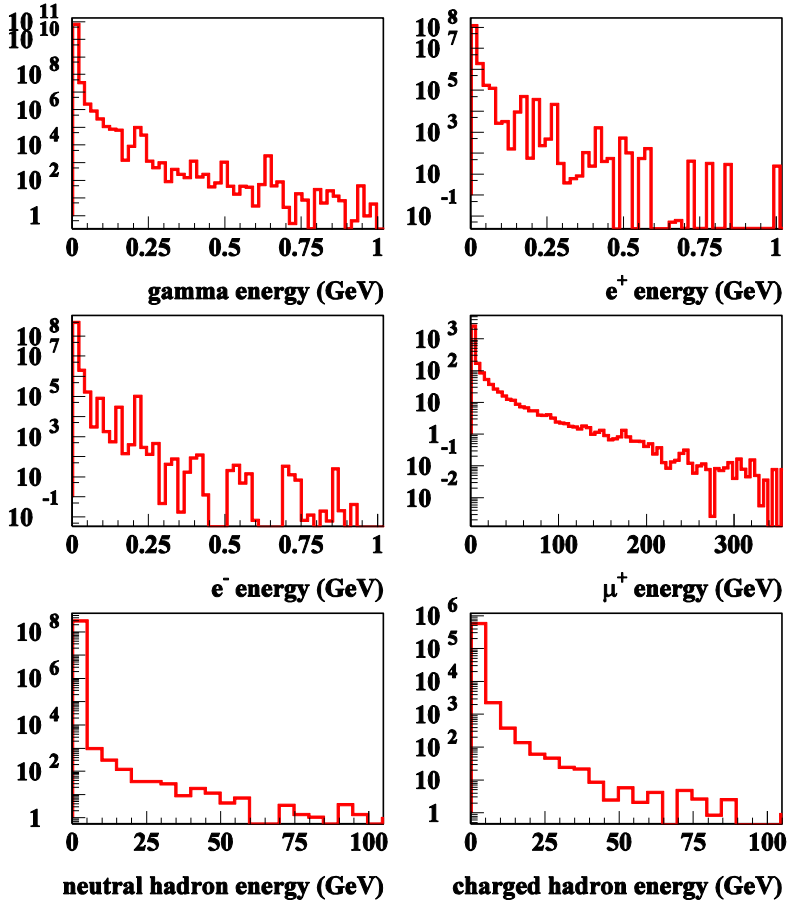
X:Z = 1:20

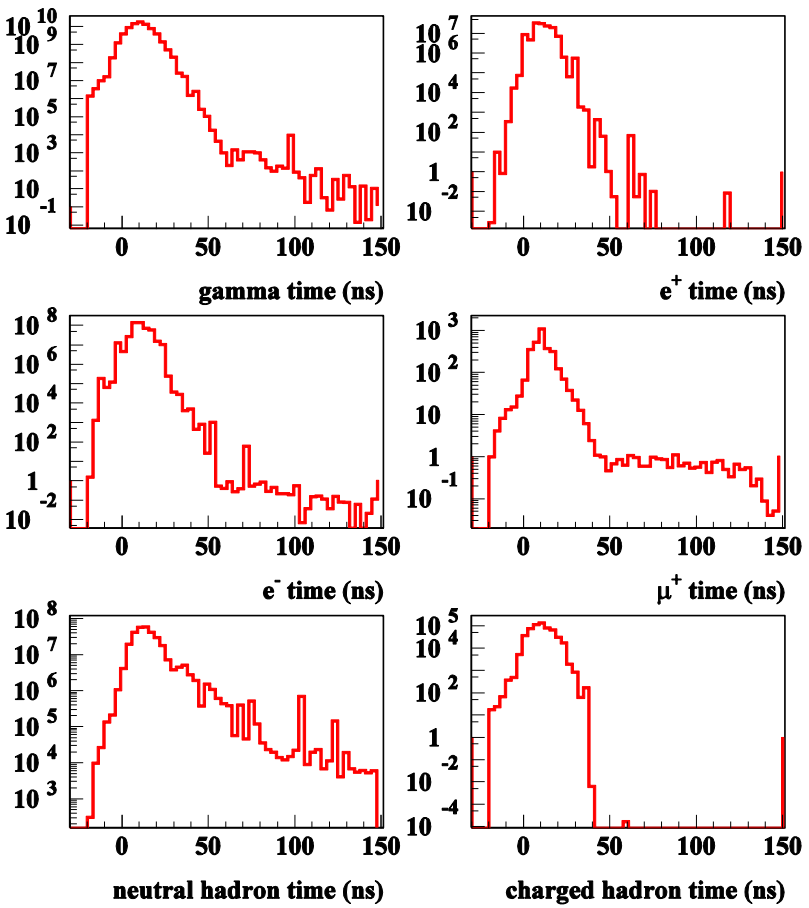
Particle Type and Z-coordinate at BH (V1)



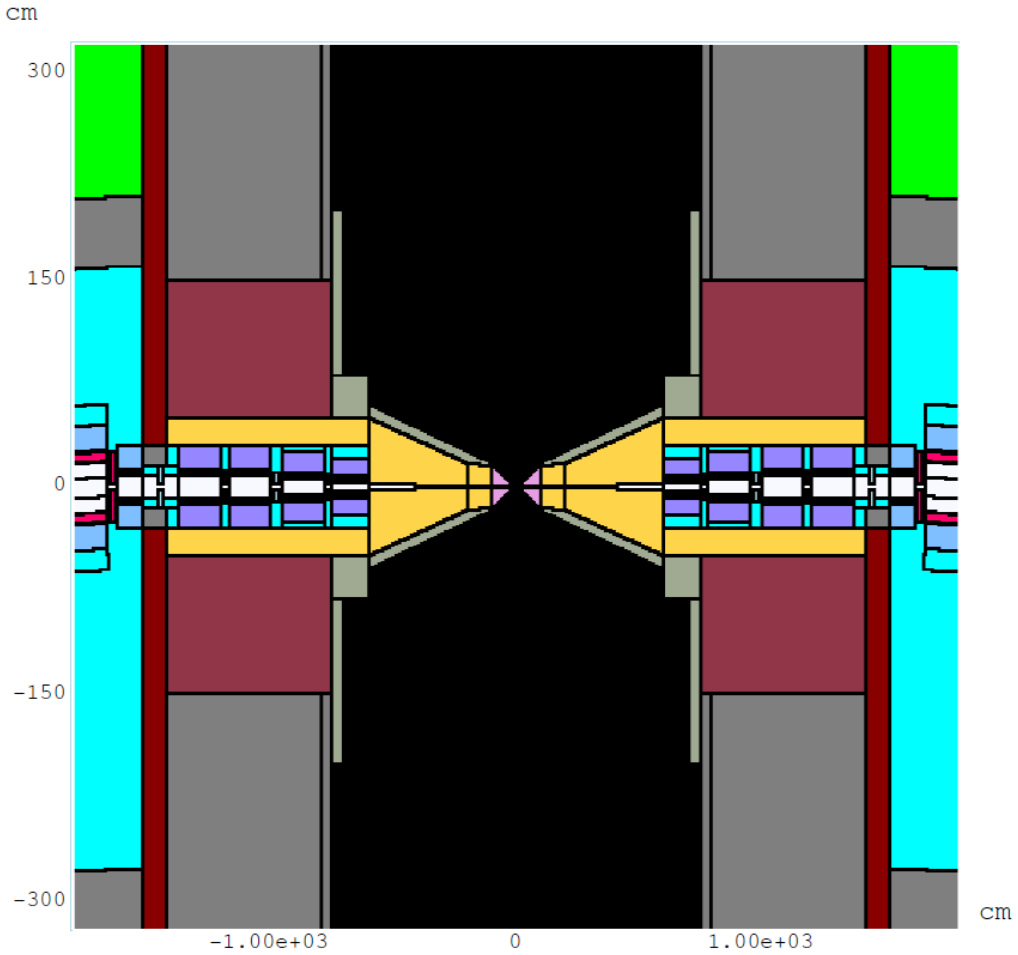


Energy Spectra and Time Distributions (V1)





Optimized Cone Black Hole (V2)



MARS15 runs are underway

X:Z = 1:5.6