Collider-Accelerator Department

BROOKHAVEN NATIONAL LABORATORY

Building 911B – P.O. Box 5000
Upton, NY 11973-5000
Phone 631 344 4116
Fax 631 344 5954
kinyip@bnl.gov
www.bnl.gov

managed by Brookhaven Science Associates
for the U.S. Department of Energy

Memo

date: *February 27, 2012*

to: *RSC, D. Beavis*

from: *K. Yip*

subject: *Dose outside the ERL room*

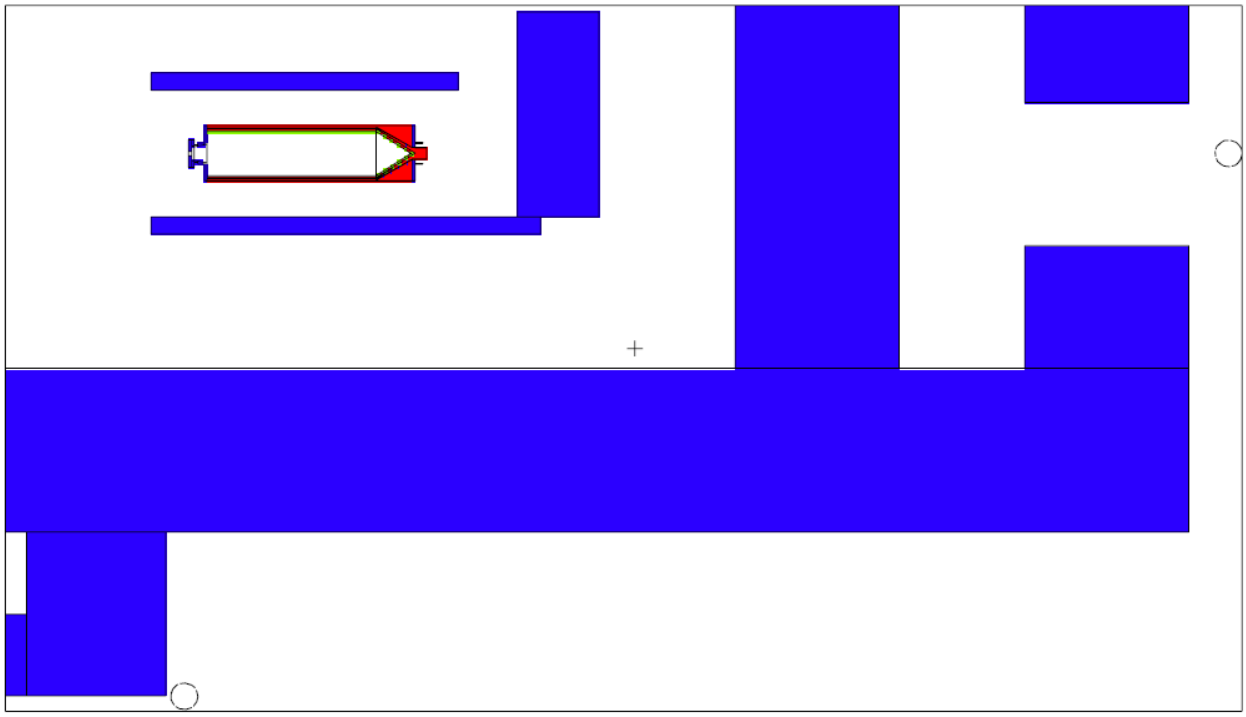
Though the dose nos. doesn't have small error as I'd like to have, they seem to be small nonetheless and I can give a limit anyway as Ilan seems eager to have it. The thick steel/concrete walls make the simulation difficult. I'll keep running for a little more...

I've put the detectors (in simulation) on 2 spots of the largest dose, (1) one in a position next to the power room at a closest position to the beam dump that a person may stand (after talking with Dave/Jesse) and (2) another one in the forward area, just 1 foot away from the door. They're not even outside the 912 building.

I've put in only 5 inches of steel at both sides of the beam dump (as Jesse has done). In the forward area, there is 2 feet of steel, of course. There is 4 ft of concrete wall etc. I've attached a view.pdf to give you a rough impression. The places with a circle are where I have my "dose detectors". ***The "power room" (with very thin wall), next to my detector/circle, is not shown. A person can't get closer to the wall as the gap between the power room wall and the concrete has only 5 inches and the circle is the closest place that a human being can get to.***

The electron beams have the same Gaussian distributions in positions and angles as last time when I reported the energy deposition in water (in fact, they're still part of the simulation). [The angular distribution seems to make everything (track => dose) less forward and more sideward's …]

The upper limits for the doses in (1) and (2) are about 1×10^{-26} rem per electron and 1×10^{-28} rem per electron respectively. With 1/3 amp, the total doses are respectively 7.49×10^{-5} rem per hour and 7.49×10^{-7} rem per hour.

The bigger 7.49×10^{-5} rem per hour is just higher than uncontrolled area limit of 5×10^{-5} rem per hour but lower than the controlled area legal limit of 5×10^{-3} rem per hour and still lower than the usual design practice of 5×10^{-4} rem per hour. Since it's a controlled area (inside 912), it's OK.

The forward area doesn't seem to be a problem at all (as 7.5×10^{-7} rem/hour is way lower than 5×10^{-5} rem per hour and I haven't even gone out of 912).