

Minutes of the LCLS BLM Simulations Working Group
January 30, 2008

Attendees/Argonne: J. Dooling; /SLAC: A. Fasso, H.-D. Nuhn, J Vollaire.

Notes:

HDN—Place transverse beam offsets at the beginning of the undulator region.

Regarding the air-pole “foam” region adjacent to the beam pipe in the MARS model, AF was not convinced and HDN believes it is too unphysical and a wrong description of the geometry. Must determine the actual CPU penalty. (Author’s note: energy deposited in the foam region allows a measure of the “shadowing” the poles provide to the magnets.)

Regarding MS’ question as to the placement of the radiator, it was stated that it could go either with the beam pipe or undulator strongbacks as discussed by W. Berg at the BLM PDR January 24th.

AF—Regarding energy deposition in the magnet/radiator, what is the critical energy in each material? Using the formula[1],

$$E_{\text{crit}} = \frac{610}{Z_{\text{eff}} + 1.24} \text{ {MeV}}$$

where the effective nuclear charge is defined as,

$$Z_{\text{eff}} = \sum_i f_{\text{wt}_i} Z_i$$

and f_{wt_i} is the weight fraction of species i ; the critical energy for quartz and magnet material is given as follows:

Material	Z_{eff}	E_{crit} (MeV)
Quartz (SiO ₂)	10.80	50.65
Magnet (Nd ₂ Fe ₁₄ B)	34.86	16.90

HDN—Geometry of the radiator is difficult to calibrate. AF—Questioned why such a complicated geometry was being used. (Author’s Note: the present radiator geometry was suggested by SLAC personnel to be similar to geometry employed at FLASH.)

Are the 2 radiators at each end of the LCLS undulator section part of the total of 33 radiators or are they additional? (Authors Note: According to D. Walters there are a total of 35 BLM radiators.)

JD—Mentioned that the PCMuon collimator geometry and a modified foil location was added to the MARS description. Possible beam intercept positions relayed by PK: OTR33, 85 m upstream of the undulators (used in MARS) and WS34, 53 m upstream.

The latter could possibly act as a BFW. HDN mentioned that no further hardware can be added upstream of the undulators and that existing components must be used.

Regarding the roles of FLUKA and MARS, HDN thought that FLUKA should be employed to look at loss estimates for the beam and MARS for calibration of the detector. AF also said that the two simulation packages should be used to check and corroborate one another.

AF commented that currently missing is an estimate of losses from beam halo. HDN— Beam alignment, initially, will be very coarse: 50-100 μm ; however at the end of the alignment process, beam offsets should be down to $< 1 \mu\text{m}$.

AF—FLUKA can do Cerenkov generation, and then optical properties of the material will be needed for calibration purposes.

The next meeting is scheduled for Wednesday February 6, 2008, 4:30 PM CST.

1. W.-M. Yao et al., Journal of Physics G 33, 1 (2006)