Minutes of the LCLS BLM Simulations Working Group
December 12, 2007
Attendees/Argonne: G. Decker, J. Dooling M. White, B. Yang; /SLAC: P. Krejcik, H. Nuhn, M. Santana.

Need to determine:

1) Expected radiation amplitudes in the BLM radiator
2) Method to calibrate the BLM signals (the response function of the radiator).

Look at roll-in / roll-out scenarios and compare hits on the foil/Beam Finder Wire (BFW) as well as the vacuum chamber.

Examine low energy and high energy beams (4 GeV – 13.6 GeV) to determine which is the worst case (shower effects). Look at radiation patterns and calibration versus various roll-in/roll-out scenarios and configurations.

Overarching concern: Do no wish to damage undulators or quadrupoles.

Monitor provides limited information (in Machine Protection mode)

Want simulation to score radiation hits both within the radiator and inside the undulator to assess dose.

Two stage approach:

1) Define the problem (i.e. roll-in/roll-out configuration, beam energy, radiation source etc.)
2) Conduct simulations—must understand how extensive the simulation needs be to do the scan comprehensively.

Radiation Sources

1) Bending beam by misaligning quads (0.2-0.4 mrad)
2) 1 micron Al foil
3) background gas scattering (gas bremsstrahlung)—presumably small

Model must be as simple as possible to be tractable yet as complete as possible to include most significant radiation effects. Include quadrupole magnetic fields on electron trajectories. J. Dooling will work out modeling scenarios with B. Yang; this folds into testing.

Magnet radiation experiments; measurements of the undulators with Hall probes. M. Santana and J. Vollaire are working on dose calculation. Mini-undulators standing by; how to irradiate? Charge out of PMT during loss studies at APS is approximately 1 nC.