
*NEED TO ESTABLISH
SNS BEAM LOSS SYSTEM
REQUIREMENTS*

SNS BLM SYSTEM REQUIREMENTS



- BLM system will be “Project-wide”
 - How will 1 W/m dose rate differ in Linac, HEBT, Ring?
 - Will SCL impose special requirements?
- Need input from Physics and Operations
 - Jie Wei’s Loss Table good start
- Need to establish parameters **NOW**
 - What is required minimum resolution?
 - What is required time response?
 - What data rates will be required?
 - How does 1 W/m equate to prompt dose rate?
 - What fault dose rates can be expected?
 - How will collimators affect losses?

BASIC BLM SYSTEM CONFIGURATION



- Same detectors, electronics throughout SNS
- Photo-Multipliers for fast bunch measurements
 - Relative measurements only – not calibrated
- Detectors for calibrated measurements will likely be Ion Chambers
 - Linac..... 94
 - HEBT..... 45
 - Ring..... 96
 - RTBT..... 57
- Ion chambers will be located at most quads

EXPECTED LOSS DOSE RATES



- 1 W/m limit imposed by working environment
 - Corresponds to 60-100 mrem/hr at 1 ft
 - What is corresponding beam-on dose rate?
 - CDR (p3-97) states 115 rad/hr at 28 cm
 - Source of this estimate?
 - Is this for uniform (1 W/m) loss?
 - What about localized loss (at Quads)?

LOSS PATTERNS



- Watts/m implies uniformly distributed loss but it may be localized at quads

(From R. Hardekopf LA-UR-99-6825)

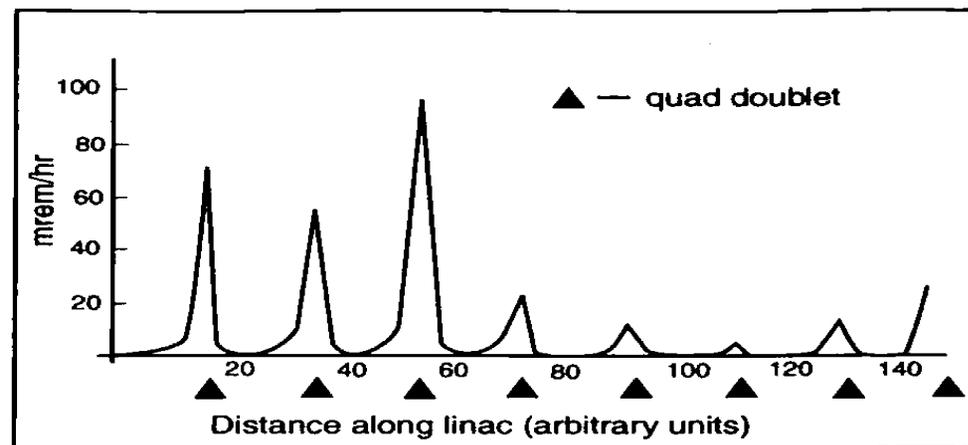


Fig. 12. Activation versus distance from the start of the LANSCE CCL. As expected the loss is greatest at the quadrupole doublets and near to the transition region.

EXPECTED LOSSES (Cont'd)



- HEBT, Ring and RTBT have collimators as limiting apertures
 - What can cause losses at other points?
 - Gas stripping of H-beam (0.13 W/m at 10^{-7} Torr)
 - Extraction kicker misfire (mis-setting or failure)
 - Ring injection mis-steering or foil failure
 - HEBT, RTBT magnet mis-setting or failure
- What are beam-on dose rates near Collimators?
 - TN-077 may provide answers

Machine/Equipment Protection Requirements



- BLM system will not provide **Primary** machine or equipment protection.
 - Designed as a measurement system
 - Will not be
 - QA-1 certified
 - Redundant
 - Fail safe
- Will provide fast (10 μ sec) beam abort signal on “significant” loss
- Will provide warning on exceeding 1 W/m over 1 second average

Special Requirements - Physics



- What capabilities are needed for commissioning and studies?
 - Range (high, low) of loss rates
 - Individual detector masking
- What data rates will studies require?
 - Detailed signal readback on multiple detectors
 - Slower beam repetition rate