

SMT Radiation Status

All Experimenters Meeting

March 25, 2002

This is a **preliminary** estimate of dose based on initial calibrations of D0 radiation monitors – I did not attempt to get the full rate data from the archives

▲ **Radiation dose monitored three ways**

◆ **BLM system**

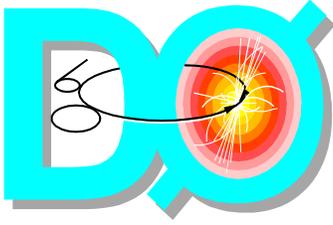
- ◆ **Interfaced to beam abort**
- ◆ **Far from silicon (downstream of calorimeter), large extrapolation to silicon dose.**
- ◆ **Integral not sensitive to small, continuous dose due to integration thresholds.**

◆ **TLDs and foils**

- ◆ **Near silicon, BLMs (cross calibration)**
- ◆ **Need to be taken out and read during summer**
- ◆ **Best absolute calibration**
- ◆ **shutdown – no new information for this talk**

● **Finger Diodes**

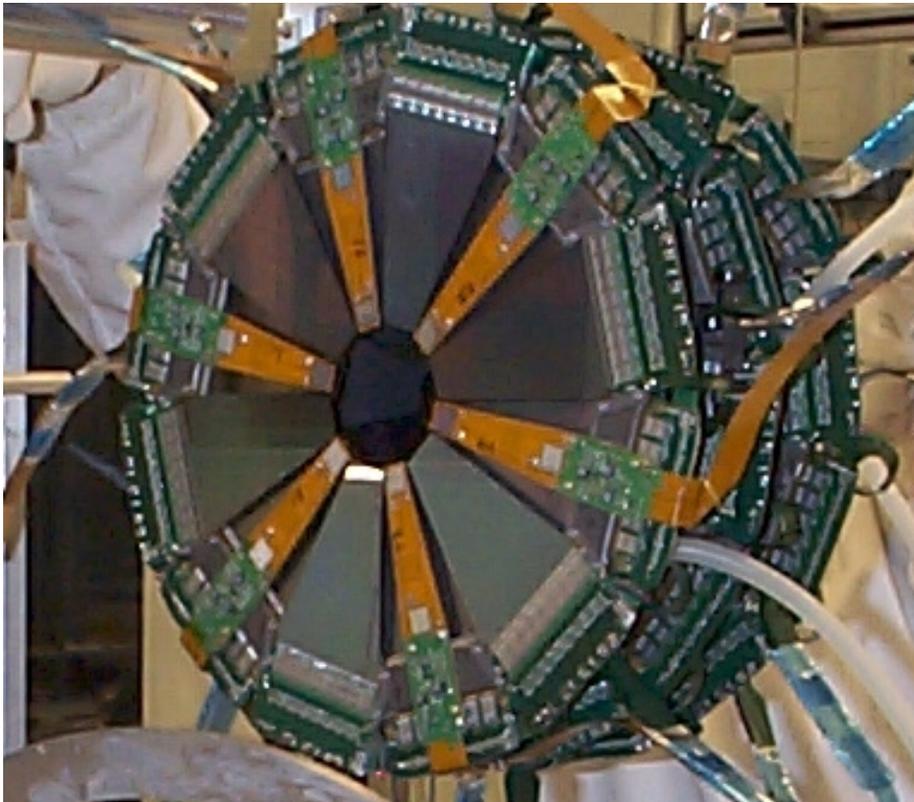
- **Archived at 1 Hz**

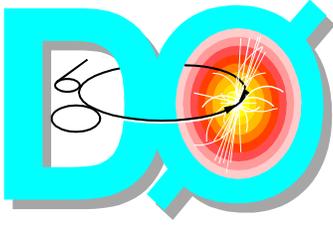


Finger Diodes

◆Diode “finger” system

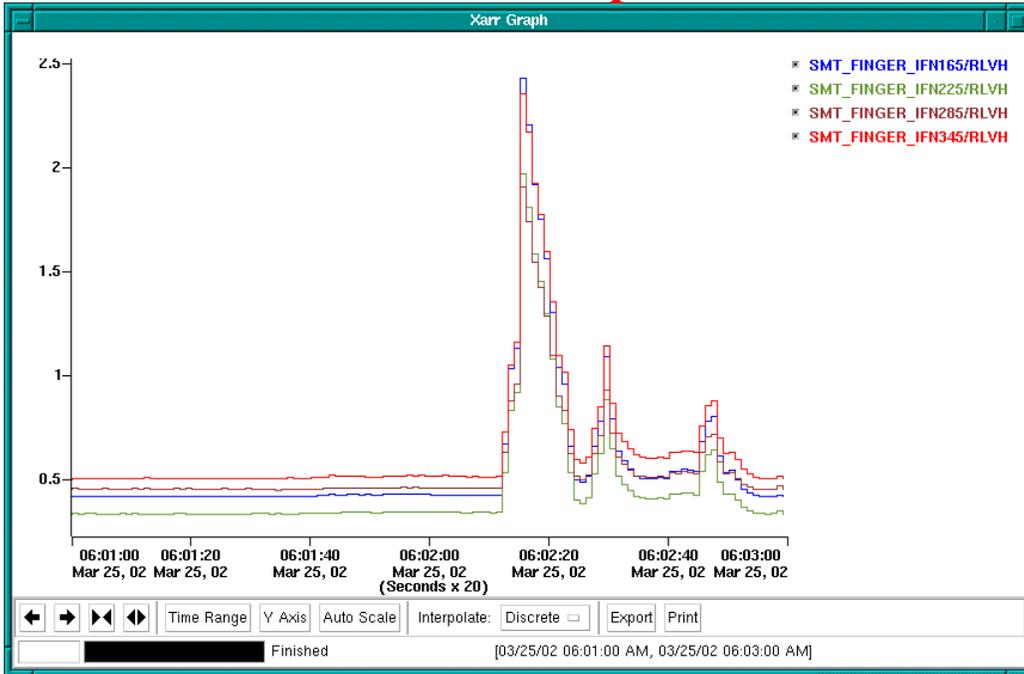
- ◆Near silicon at 4 radii
- ◆Original ADC system not sensitive enough to small losses
- ◆Added discriminator/scaler system to read out smaller, continuous losses
 - ◆Noise too large for MIP counting (~ 2 MIP threshold), need to cross calibrate
 - ◆New electronics added in mid-February – need to recalibrate



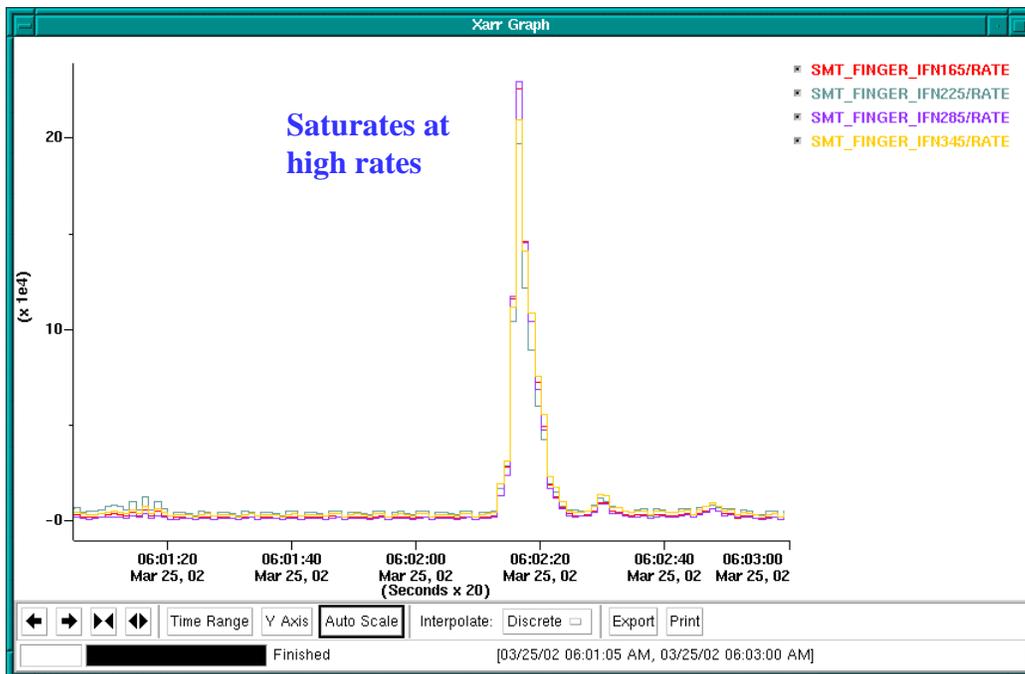


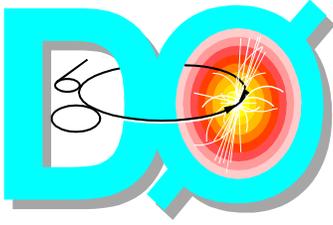
Step 13 Losses in BLM, ADC and Scalers

ADC Output

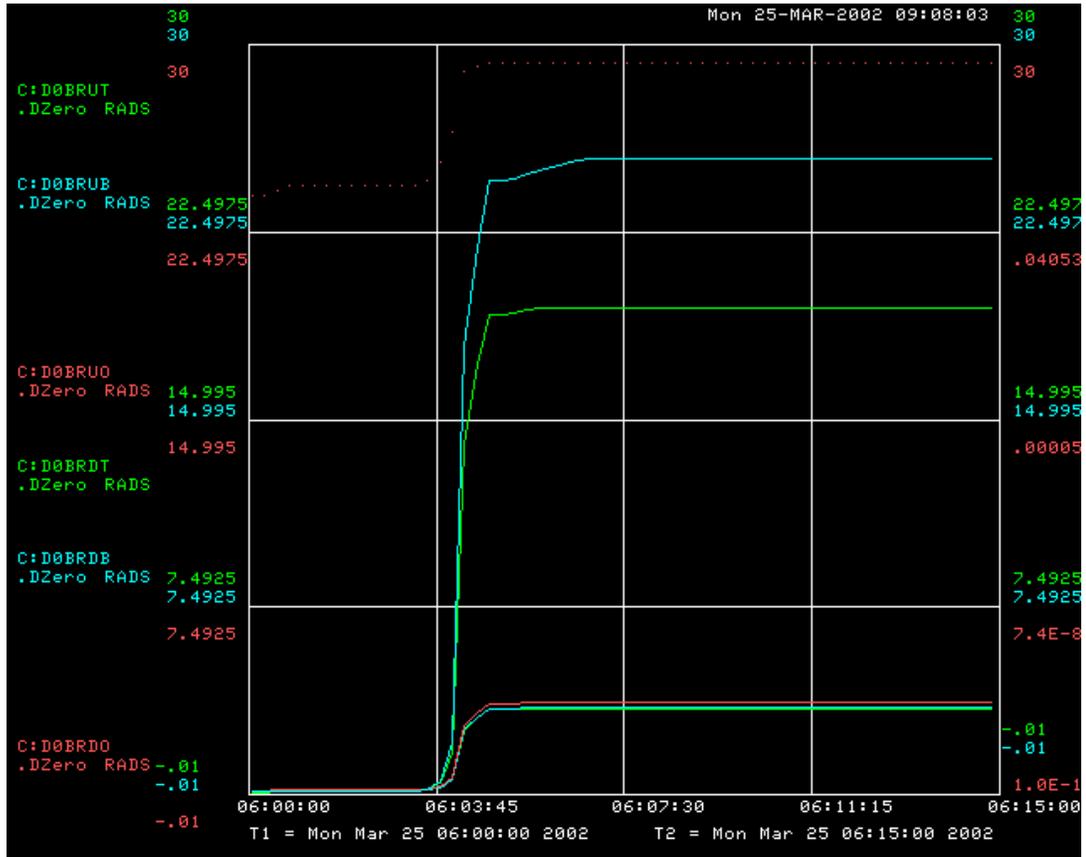


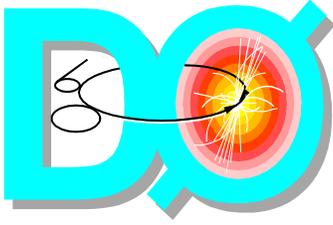
Scaler Output





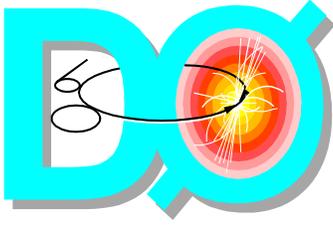
BLM Integral





Cross Calibration – Use step 13 losses eg shot 860

- Average BLM peak rate - 5.3 rads/sec
 - Average finger peak rate – 2.0 rads/sec
- So BLMs ~ 3 meters downstream actually register an instantaneous rate a factor of 2.6 higher than the finger diodes.
- Finger rates were calibrated using coincidences with level 0 trigger scintillator counters. The ~70 mV finger analog threshold corresponds to ~2.5 MIPS – a factor of 10-15 for the dose calculation.



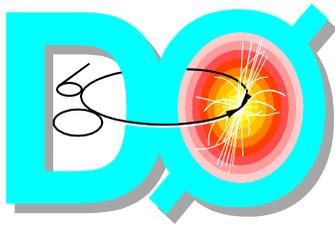
Total Dose

For a typical store:

$\langle L \rangle \sim 5E30$, 20 hours, at ~ 300 Hz

This corresponds to ~ 8 rads/store at the inner radius.

- ◆ Typical step 13 integrated losses have been 20-30 rads at the BLMs which corresponds to 7-11 rads at the fingers so the step 13 losses are comparable to losses during the rest of the store.
- ◆ Integrated luminosity ~ 30 pb⁻¹
integrated MIPs $\sim 3.8E10$
integrated dose ~ 1200 rads from luminosity



Magnetic Field Effects (Looping Tracks)

