

Contributions to SMT Dose from Luminosity and Beam Halo

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We have used the SMT finger counters to determine the contributions to the charged particle flux at $r = 2.7$ cm from beam halo and luminosity. The finger rate output counts individual charged particles passing through 1 cm square photodiodes with a threshold of about $2.5 \times \text{MIP}$. Halo rates and instantaneous luminosity are taken from the D0 luminosity monitoring system(ref). The data analyzed was from store 2121 on Jan 1, 2003.

Data from the lowest noise finger counters was extracted from the EPICs archiver and the fits were performed for finger IFS225. Rate distributions from other fingers at the same radius have very similar shapes. Halo and luminosity data were extracted from the ACNET Lumberjack archiver. Luminosity falls more rapidly as a function of time in the store than halo, so we can determine the fraction of halo rate due to luminosity by fitting to the shape of the luminosity and p and pbar halo curves. Fits were done using the solver in Microsoft EXCEL which does not provide errors of correlation coefficients. This will need to be redone in a proper fitting program. The p, pbar and luminosity curves were normalized to intersect at a time in the middle of the store. Coefficients were then determined to fit the halo rate curve shape. This was done for all three parameters (p, pbar and luminosity) and for only two (p and luminosity) since the shapes of the pbar and proton halos are similar. Figure 1 shows the data and fit curve for the three parameter fit.

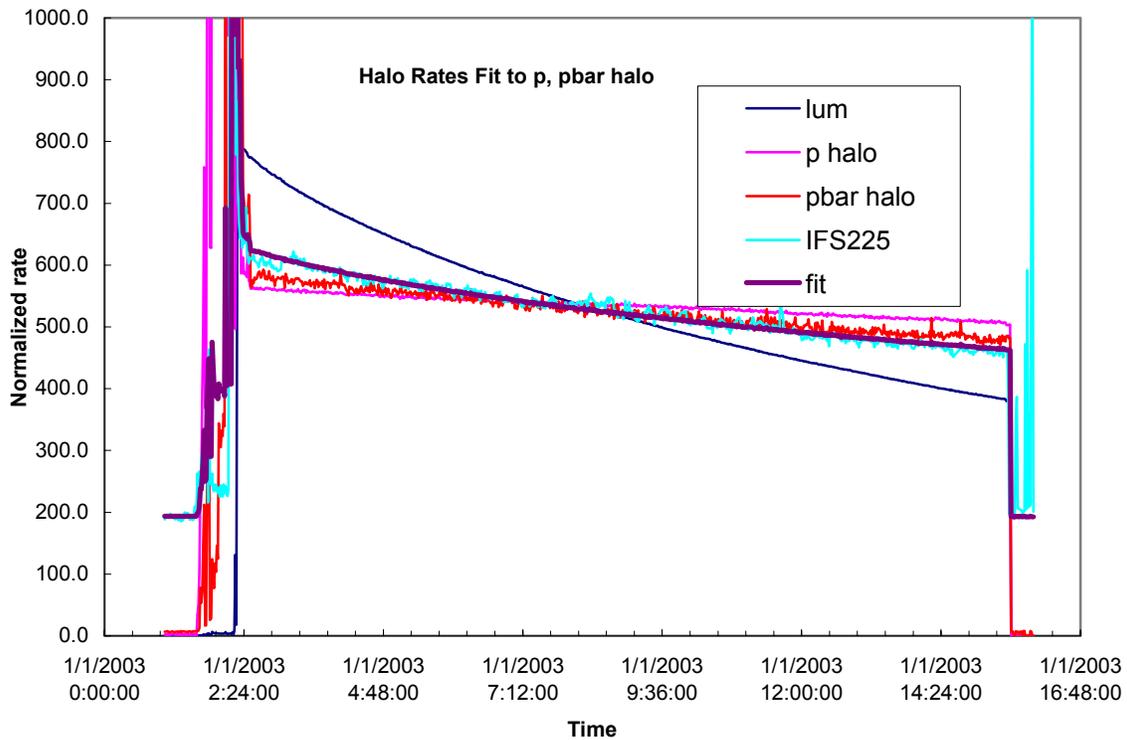


Figure 1. Rates for store 2121. Fit is to pbar, p halo and luminosity

Table 1. Fit values for three parameter fit

Name	Three parameter fit	Two Parameter fit
phalo factor	0.150	0.250
ahalo factor	0.121	
Lum factor	0.359	0.378
Lum fraction	0.57	0.60

Figure 2 shows the result from the two parameter fit. Both results show that about 58% of the rate comes from luminosity-associated particles.