

NLC Memorandum

December 11, 2000

To: Distribution
From: D. Schultz
Subject: An accounting of the beam intensity on the SLC positron target.

The positron target under analysis at LANL was installed on the SLC in January 1993. There were four running periods; Jan. '93 to Oct. '93, Feb. '94 to April '95, Dec. '95 to Sept. '96, and May '97 to July '98.

The SLC control system recorded the number of electrons on target during most of this time, as measured by a toroid, 'PT01 376', located just in front of the positron target. This history is plotted below.

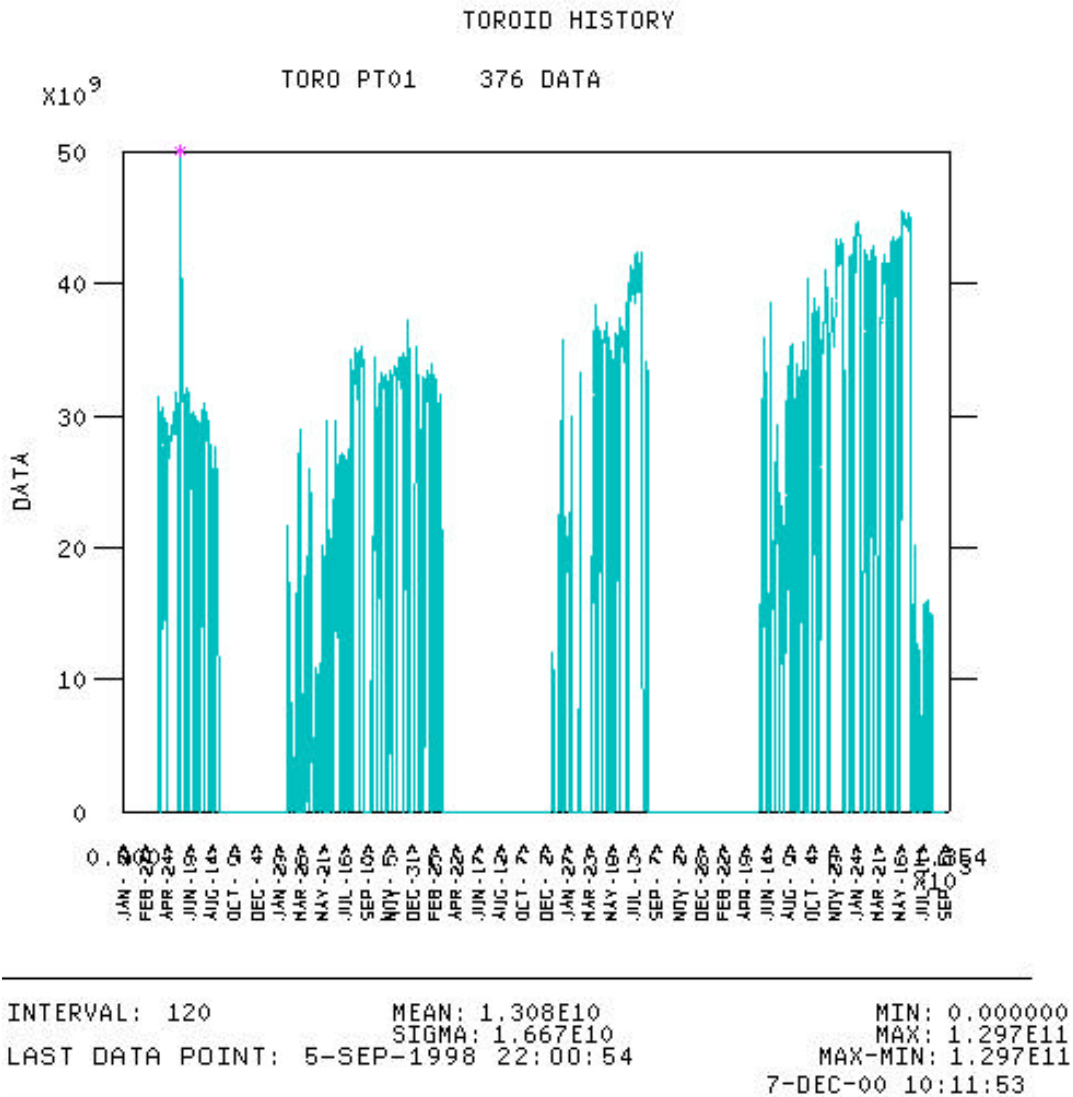


Figure 1, the electron beam intensity on the positron target as measured by toroid PT01 376.

During these runs the beam intensity was increased from 3×10^{10} to 4.5×10^{10} electrons per bunch. The electron beam energy was about 30 GeV (see fig. 2).

The data shown in figure 1 is sparse. There are twelve values stored for each day, separated by roughly two hours. The values stored are the toroid reading made for the single beam pulse that occurred at that time. There is no averaging done to take into account machine up-time or lost pulses.

For the first seven weeks of this period the toroid data is missing from the history database. While this turn-on period was surely less efficient, it is assumed that the number of electrons on the target for this period was equal to the number in the following seven weeks.

Most of this time the accelerator ran at 120 pulses per second. Occasionally, during tuning at start-up in particular, the beam rate was lower. The history of beam rate is also recorded, but is problematic. There is missing data, and at times the rate data is inconsistent. An attempt has been made to identify periods of low rate operations, and to account for them.

The values shown in fig. 1 were multiplied by the number of seconds between records and by the machine rep. rate at the time and summed.

The accounting:

Total number of electrons assuming constant 120 hz operation:		2.57×10^{20}
Correction for occasional periods of lower rep. rate	9%	-2.27×10^{19}
Addition made for missing toroid data 2/10/93 - 3/29/93		$+1.14 \times 10^{19}$
Estimate of number of electrons on target		2.46×10^{20}

