Figure 1: The number of interactions per crossing is shown as a function of instantaneous luminosity for different numbers of bunches.

1 Introduction

The recent publications of the discovery of the top quark[1, 2] and the precise measurement of the W mass[3], as well as approximately 90 other publications, have shown that the CDF detector and collaboration are extremely successful in production of fundamental physics results. In Run II the accelerator luminosity is expected to be an order of magnitude larger than the present values. For the next ten years Fermilab provides a unique opportunity to probe the fundamental parameters of the standard model, and beyond, with the highest energy collisions in the world. The CDF collaboration is planning to upgrade the current detector to take full advantage of the high luminosity available in Run II. This document describes the CDF physics program for the upgraded detector and 2 fb^{-1} of data.

In Run II, the accelerator is expected to operate at a center of mass energy of 2 TeV and initially with 36 bunches (396 ns bunch spacing) and instantaneous luminosity of 5-10x10^{31}. As the run progresses, the luminosity and bunch intensities will increase. A move to 99 bunches (132 ns bunch spacing) will keep the number of interactions per crossing at less than or equal to the current Run Ib level of $\approx$ 3 interactions per crossing. Figure 1 shows the number of interactions per crossing for different number of bunches as a function of instantaneous luminosity.

The CDF detector upgrades are described in detail in a separate document[4]. They include:

- A scintillating tile-fiber calorimeter in the region $1.1 < |\eta| < 3.5$. This detector will be

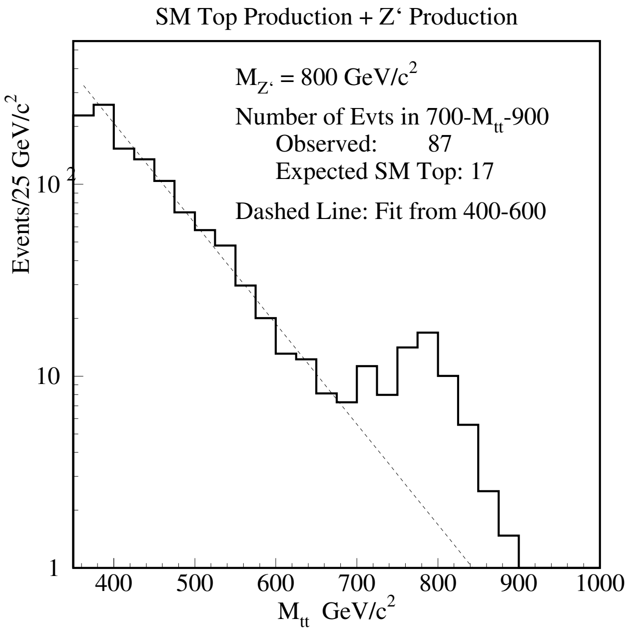

Figure 7: A hypothetical $M_{t\bar{t}}$ spectrum with an 800 GeV/c^2 Z$'$ topcolor boson. The rate is based on the theoretical predicted cross section for $t\bar{t}$ production and Z$'$ production [19] with 2 fb^{-1}.

with searches for exotic physics with the $t\bar{t}$ system will be carried out. Run II promises to be an exciting time for top physics, a newly opened area of study.