# CTB/TOF Calibration

**Pablo Yepes**
Physics Department, Rice University, Houston TX 77251-1892

March, 1995

## 1 Introduction

The Central Trigger Barrel (CTB) is intended to provide fast multiplicity information at the hardware trigger level. It consists in a cylinder of scintillators readout with photo-multipliers (PM) placed around the central TPC. The amplitude of signal from the PM is proportional to the number of particles traversing the corresponding scintillator. The Time of Flight will replace all or part of the CTB. It will provide particle identification in addition to replacing the CTB in its triggering task.

## 2 Amplitude

In the present design of the CTB and TOF, the scintillators will be read by photo-multipliers. However the following considerations would be also valid if other devices, like photo–diodes, were to be used.

A fast relative calibration can be obtained by comparing the amplitude distributions in each counter. In the present design the counters have equal coverage in the polar angle, $\phi$. However their coverage in rapidity changes along the axis parallel to the beam. Since the particle density is constant in rapidity, the distributions have to be corrected for their different acceptance before comparing counters. An additional correction due to the different

trajectory length of particles inside the scintillator is also needed. The simplicity of the procedure, once the correction factors are known, allows its implementation in the on-line environment.

An absolute calibration, establishing the number of particles traversing a counter from the signal provided by the pm, needs the TPC information. This can be achieved by extrapolating the tracks reconstructed in the TPC to the CTB/TOF and comparing their number with the produced signal. Since this procedure requires track information, it is only possible off-line.

# 3 Timing

This section concerns only the TOF, since the CTB does not provide timing information.

A rough relative calibration can be obtained by comparing the raw time distributions from the TDC's over many events. The leading edge of such a distribution should be proportional to the path length from the interaction point to the counter. Unfortunately the path length for a given counter is not a constant since the interaction point varies event-by-event. This variation will make this relative calibration more complicated. However we think that a fast relative calibration can be obtained using this technique. As in the case of the amplitude, this kind of analysis could be performed on-line and should be included in the monitoring tasks of the TOF slow-controls.

A absolute calibration of the TOF requires TPC information. The present ideas are based on the comparison of the reconstructed particle masses with a given counter with the nominal mass values. This procedure is only possible off–line since the full tracking capabilities of the STAR detector will be required.