Application of simple algorithm for hadron rejection to Data

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# 1 Comparision of trigger distributions: Data vs MC

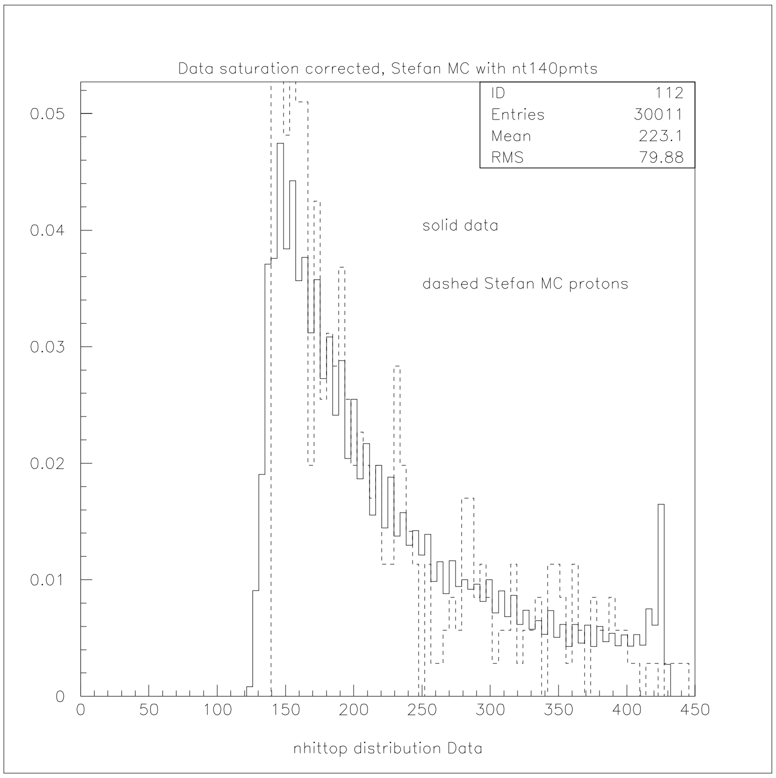


Figure 1: Nhittop distributions

Recent data was analyzed using Andy's calibrations using ADC information. We have examined several features of the data with Stefan's MC for protons. Figure 1 compares the normalized nhit distributions of data and simulations. There is a good similarity between these distributions except for saturation at the upper end, something we expect from presence of dead tubes. Note that MC is for nhit greater than 140 to correspond to the trigger in data.

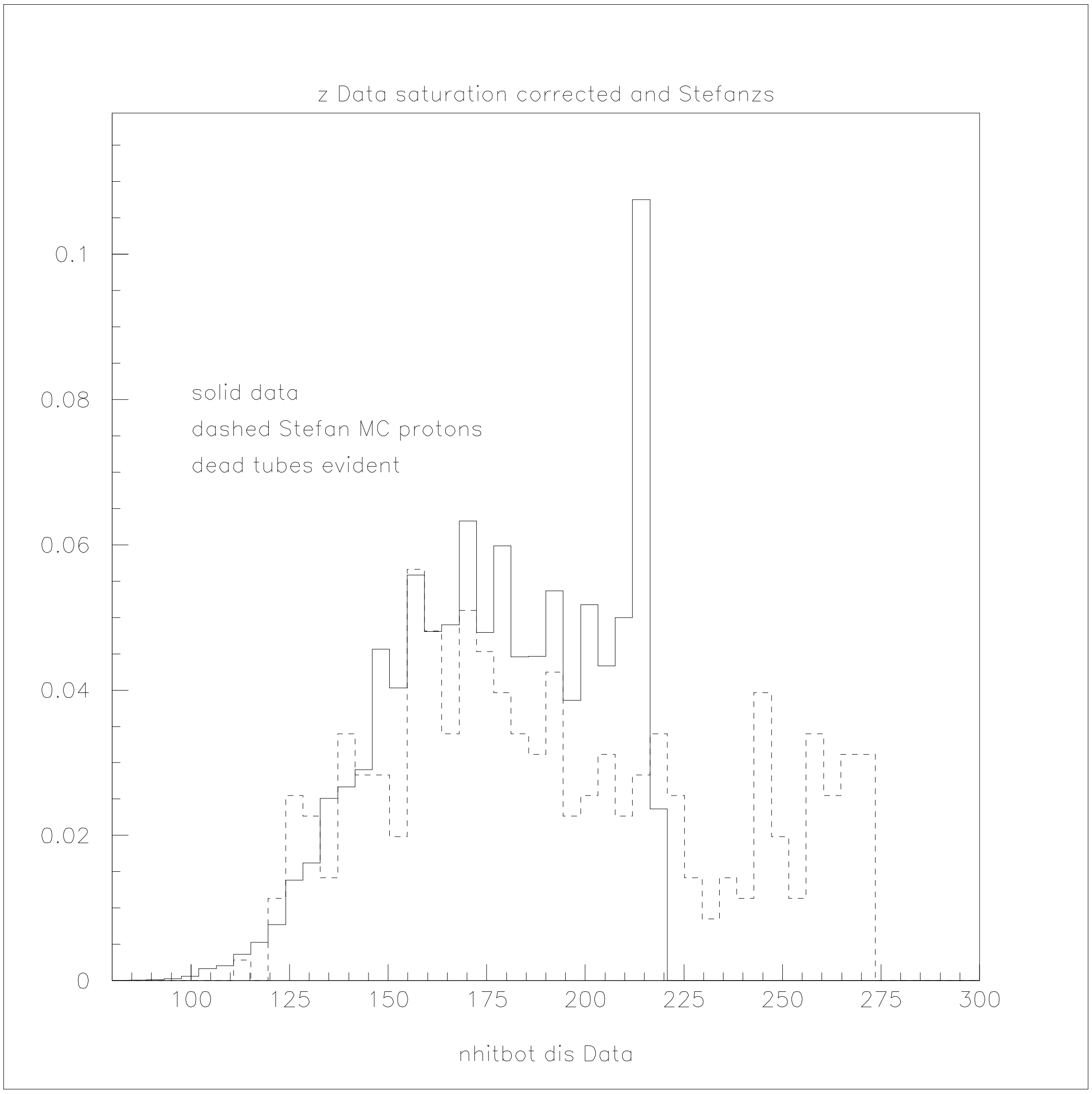


Figure 2: Nhitbottom distributions

Figure 2 shows the normalized protons and gamma distributions for number of tubes hit in the bottom layer. For simulation there is a cut of nhittop greater than 140 to correspond to trigger threshold in data. The effect of dead tubes is evident.

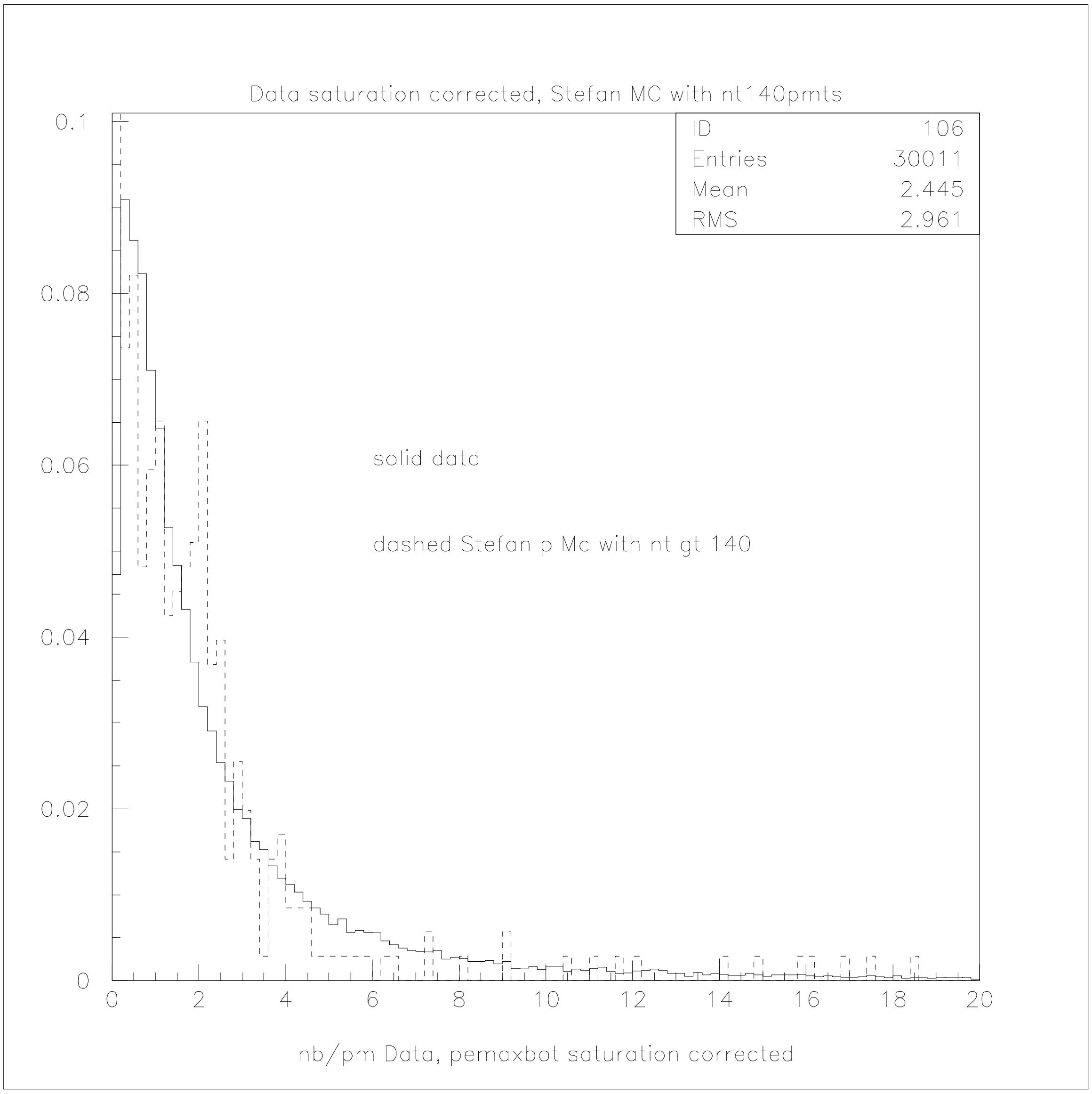


Figure 3: A comparision of normalized nhitbottom/pemaxbottom distributions for data and simulations of protons. A saturation correction was made for pemaxbottom pulse height based on Milagrito studies before making the plot for the data. Although simulation data sample is small, the distributions show remarkable similarity.

# 2 Quality Factor that can be expected at present

We examine effects of nb/pm cut on data and simulated gamma sample. Only a simple cut is made in the following two figures.

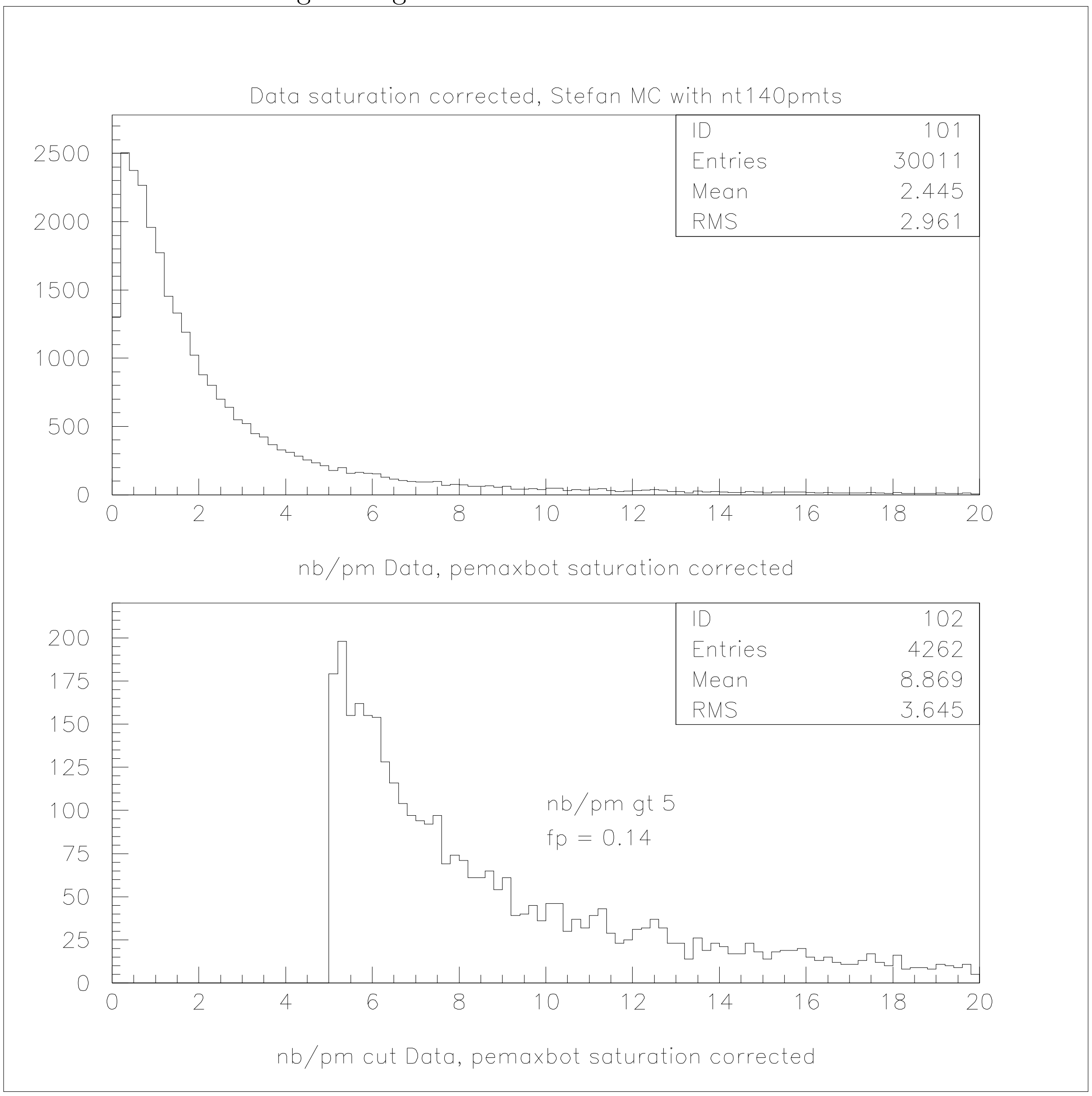


Figure 4: This figure shows the effect of making a cut on the variable nbottom/pemaxbottom of requiring it to be greater than 5. The cut retains 14 percent of the protons. Next we do the same for simulated gammas, shown in the following figure

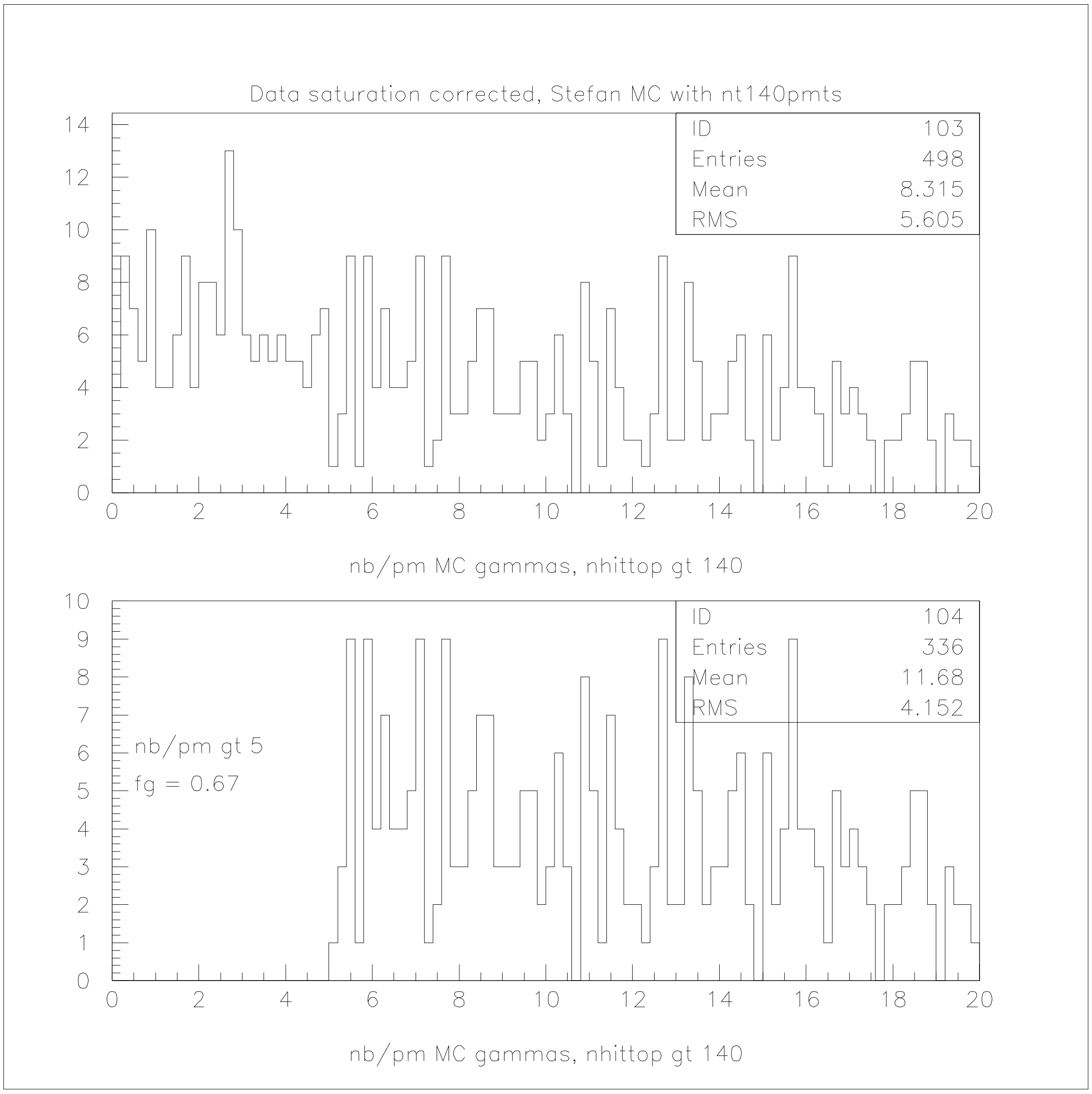


Figure 5: Uncut and cut distributions of simulated gamma events with nhittop greater than 140 tubes are shown in this figure. A cut of requiring nbottom/pemaxbottom greater than 5 retains 67 percent of the gammas.

**A qfactor of 1.79 is obtained with this simple cut** provided the simulation for gammas corresponds to nature !!

# 3 Q factors for large number of tubes in bottom layer:

This study was not included in earlier memos so for completeness we include this additional information.

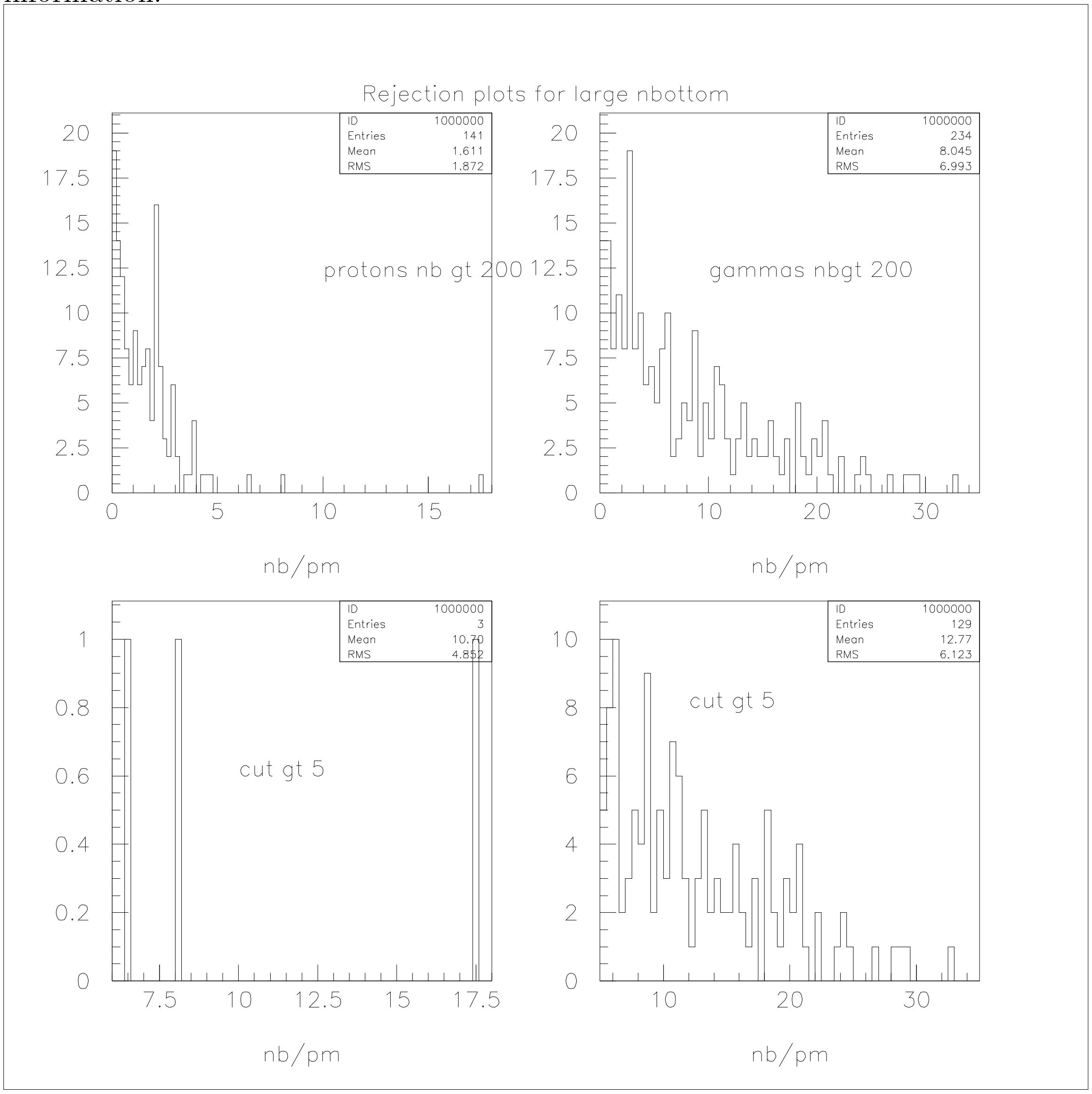


Figure 6: The quality factors that can be obtained with our simple cut for large number of tubes hit in the bottom is shown dramatically in this plot. This figure is for all events with more than 200 tubes hit in the bottom layer. For a nb/pm cut of greater than 5 we throw away all but 4 percent of protons and retain more than 50 percent of gammas. This gives a Q factor of 3.78. This result can be compared to Figure 7 in Rich's memo directly. This is based on Stefan's simulations.