

MBD-HCal Correlation Performance Plot

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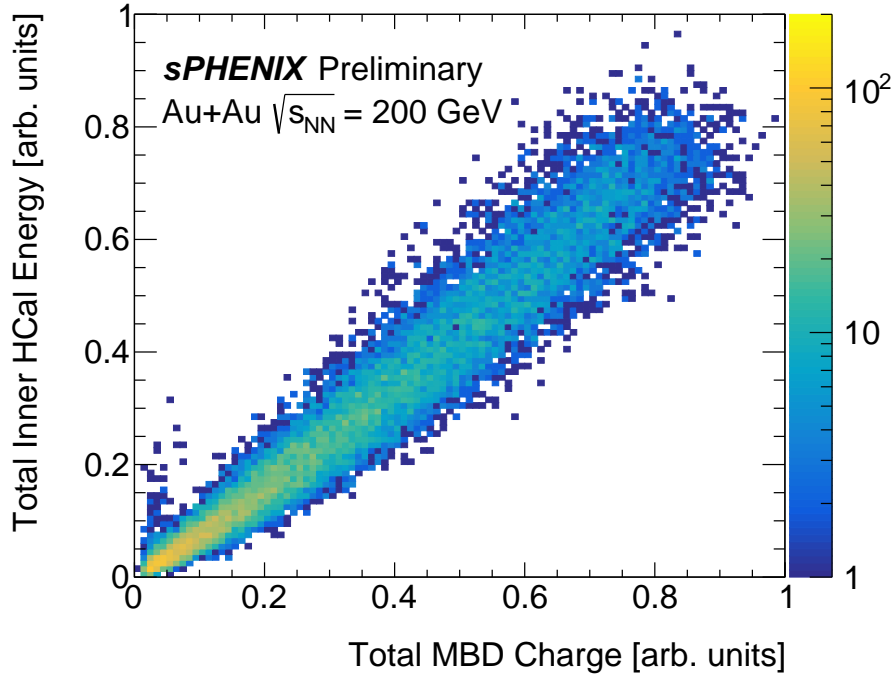


Figure 1: The correlation between the total amount of charge in the minimum bias detector and inner hadronic calorimeters in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV.

The correlation between total MBD charge with total Inner(1) and Outer(2) HCal energy (run 7156 taken at 5am May 22 2023) is shown. Both axes are normalized with the maximum energy/charge among all events. The MBD trigger used for this data set requires a 20 hit coincidence on the south and north side with no timing difference cut (that is, without a vertex cut). The signal peaks were extracted using the [FAST](#) option in CaloWaveformFitting, using a timing cut to reject towers with peak sample > 10 . To remove backgrounds, a tight MBD north-south charge asymmetry cut ($A < 0.1$) was applied, where,

$$A = \frac{|MBD_{north} - MBD_{south}|}{MBD_{north} + MBD_{south}}$$

The primary source of background in this run stems from the lookup tables in the MBD trigger being N-S asymmetrical, resulting in the asymmetry as shown in Figure 3. The asymmetry cut was used to mitigate this effect. A total of 110k events were analyzed and 15k events have passed all cuts.

The fact that HCal and MBD energy and charge, are correlated shows that the HCal is timed in correctly with the MBD and collisions are occurring in the sPHENIX detector.

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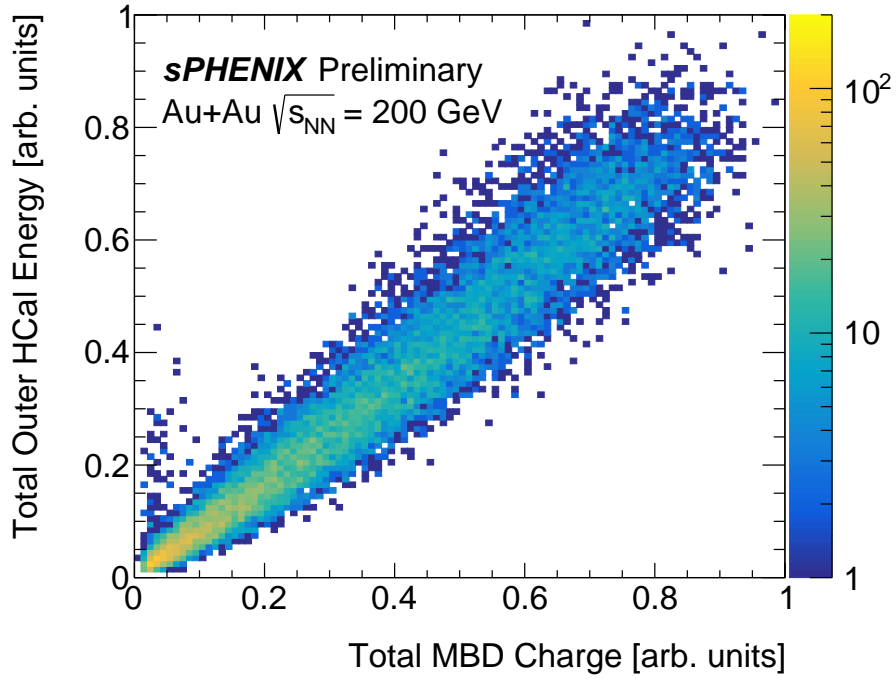


Figure 2: The correlation between the total amount of charge in the minimum bias detector and outer hadronic calorimeters in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV.

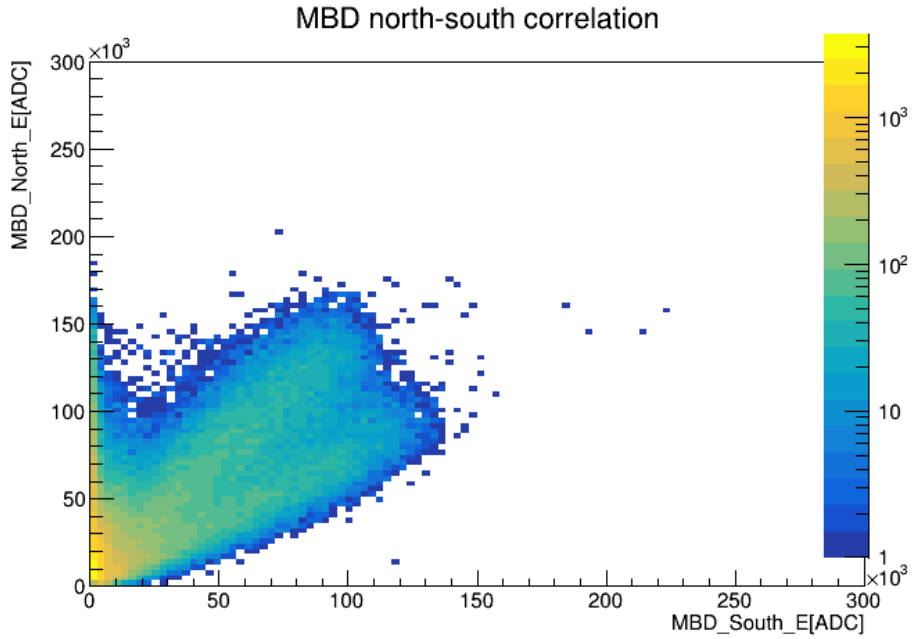


Figure 3: The correlation between the total amount of charge in the north and south arm of minimum bias detector for run 7156 before cut.