INTT Weekly Meeting

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Workflow Overview

- Goal is to test Chris's BCO matching method
- Procedure is to use it in `Fun4All` to create `ROOT` files for analysis
- These `ROOT` files are organized one entry per "event," with `std::vector` type that have a size exactly commensurate with hit multiplicity
  - By "event" I mean with respect to software–the collection of hits I get from a `packet/pool` type object in the (`override`) implementation of a `SubsysReco::process_event(PHCompositeNode*)` class method
  -
- These files are parsed and I count the hits to our inner layers (layers 3 and 4 using the tracking indexing convention) and to our outer layers (5 and 6)
- I then make a correlation scatterplot of hit multiplicity, with one point per event

Run 20445

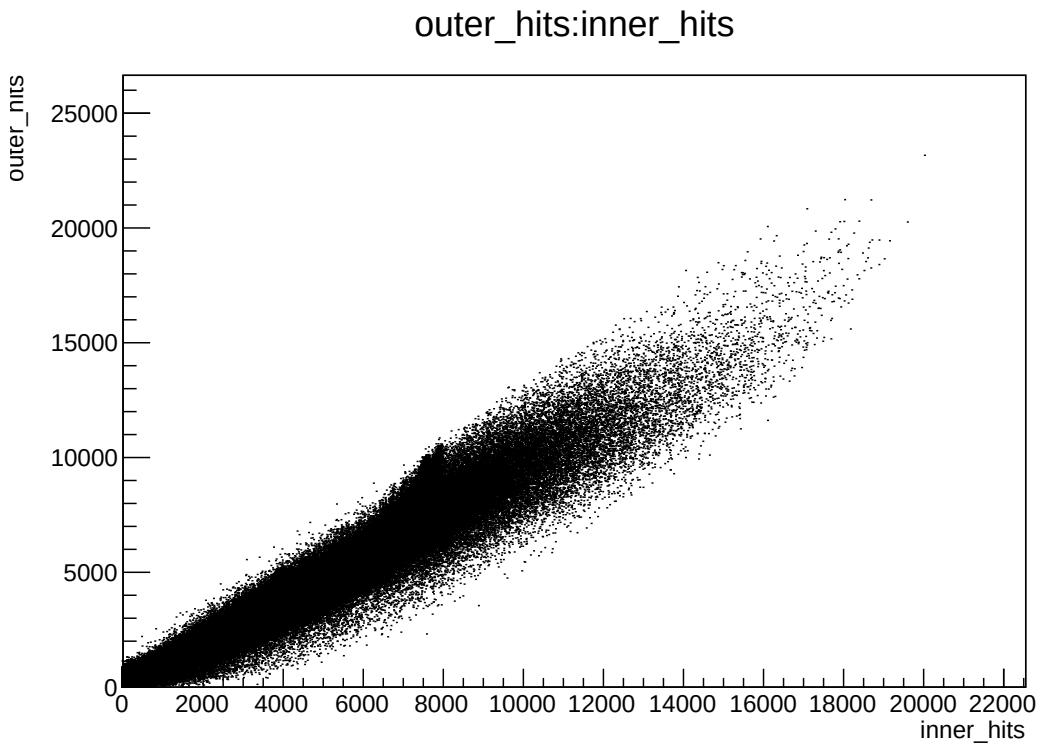

Figure: Correlation plot for run 20445. You may notice an uncanny bunch at about `inner_hits`=8,000 and `outer_hits`=10,000. Otherwise, there is the clear linear correlation that you would expect

Run 23046

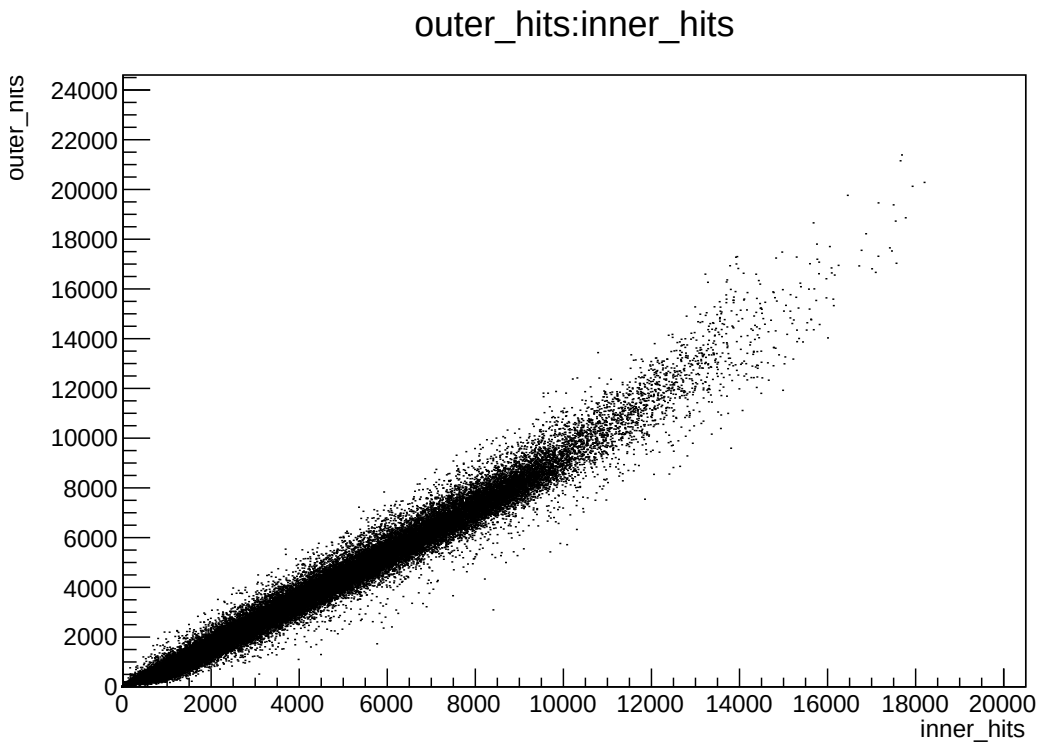

Figure: Clear linear correlation that you would expect

Run 23047

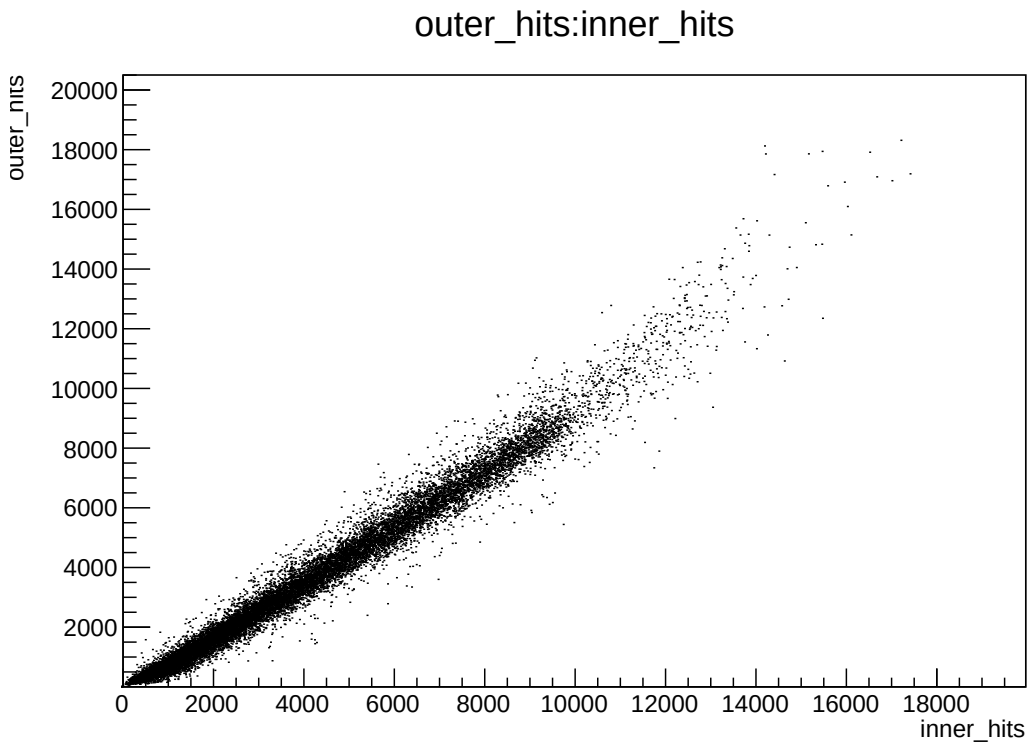

Figure: Clear linear correlation that you would expect

Codes

- The "Converter" codes which implement the `Fun4All` framework that were used to produce the `.root` files from `.evt` (PRDF) files that were used for analysis:
  - https://github.com/sPHENIX-Collaboration/coresoftware/blob/master/offline/packages/intt/InttCombinedRawDataConverter.h
  - https://github.com/sPHENIX-Collaboration/coresoftware/blob/master/offline/packages/intt/InttCombinedRawDataConverter.cc

Codes (Cont'd)

- The `Fun4All` macro which used these library classes and the shell script that called it:
  - https://github.com/josephbertaux/INTT/blob/josephb/general_codes/josephb/macros/CombinedRawDataConverter.C
  - https://github.com/josephbertaux/INTT/blob/josephb/general_codes/josephb/macros/CombinedRawDataConverter.sh
- The `ROOT` macro which parsed the `.root` files to produce the correlation plots and the shell script that called it:
  - https://github.com/josephbertaux/INTT/blob/josephb/general_codes/josephb/macros/DebugCombined.C
  - https://github.com/josephbertaux/INTT/blob/josephb/general_codes/josephb/macros/DebugCombined.sh

Summary

- Run 20445 had a strange feature, but this was not repeated in runs 23046 nor 23047. It may be a fluke unique to 20445 or older runs
- Clear linear correlation present in all runs
- More recent runs look qualitatively fine

Next Steps

- Analyze additional runs
  - I intend to analyze a subset of runs from 23046 and 24356
  - Will choose a varied sample and will not work sequential to obtain stratified data
- Improve appearance of plots
  - Histograms instead of scatterplots
  - Same maximum value for x and y axes
  - Incorporate sPHENIX drawing macro
- Cluster multiplicity correlation
  - Previous plots for QM2023 and the AGS meeting in July were based on cluster multiplicity; this analysis was hit multiplicity
  - Both correlations should be analyzed; hit multiplicity directly reflects BCO matching, but cluster multiplicity can account for physical effects or tendencies
- Correlations against other subsystems
  - Reproduce correlations with other subsystems (e.g. TPOT, MBD) that were done for QM2023 and AGS meeting
  - Identify suitable run numbers for these analyses