

INTT Weekly Meeting

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- Analysis of hot/dead channel map stability
 - Want to know how often the hot/dead map needs to be recalibrated
 - E.g. run by run or store by store
 - We should do this over a set of “good” runs; we need to identify at least about 10 runs to do this
- Elements/fields to include in `InttEventInfoContainer`
 - This is the event header
 - BCO
 - FEMCLCK
 - ...others?

- Basic idea is to compute correlation of states/posterior probabilities between runs
- For the statement $\phi(n, i, s)$ that “channel n was in state s in run i ”
 - Where the state s might be hot/dead/good—let s_i be the state of the channel in run i
- We should compute, for each channel, the posterior

$$\mathcal{P}(\phi(n, i, s_i) \mid \phi(n, j, s_j)) \quad (1)$$

- We average this over i, j for some range of runs
 - \mathcal{P} to be 1 iff both statements are true
 - and 0, otherwise
- We make a decision about hot/dead channel map stability based on the distribution of \mathcal{P}

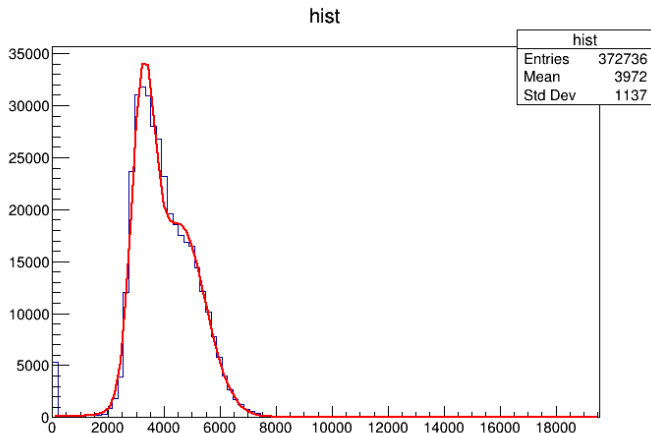


Figure: Convergence of fit for run 20869. Numerically there is a Gaussian which captures the dead hits near zero, but it is not clearly visible in the graph

The parameters for the Gaussian fit on the previous page. Here rho corresponds to amplitude

```
s: 0  
avg: 3252.71  
sig: 409.906  
rho: 2.84359e+07
```

```
s: 1  
avg: 4564.25  
sig: 913.423  
rho: 4.19109e+07
```

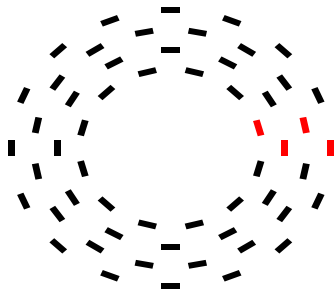
```
s: 2  
avg: 1.51592e-07  
sig: 4783.68  
rho: 1.86812e+06
```

- Currently I use a fairly generic and sophisticated fitting method
 - Fit in sequence—1 Gaussian fit, 2 Gaussian fit, 3 Gaussian fit, . . .
 - Initial parameters for the new Gaussian are computed weighted more by points the previous Gaussians did not fit well
- Once we have a good idea of the “good” average multiplicity, fit with means constrained to explicit windows

- Tony and I noticed a discrepancy when incorporating survey data into the tracking workflow

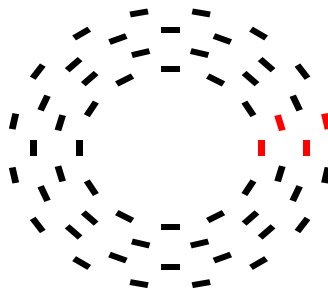
INTT Cross Section

(Correct phi offsets)



INTT Cross Section

(Incorrect phi offsets)



- The source of this discrepancy can be traced to differences in some codes
 - The correct specification of phi offsets in `PHG4InttSubsystem.cc`,
 - <https://github.com/sPHENIX-Collaboration/coresoftware/blob/0d893f314c83936bdcd5ced628997992d80fa946/simulation/g4simulation/g4intt/PHG4InttSubsystem.cc#L191>
 - But are overridden by incorrect values in `G4_TrkrVariables.C`
 - https://github.com/sPHENIX-Collaboration/macros/blob/7d8c9b53784694a9b95c2200cb2db19c6745494e/common/G4_TrkrVariables.C#L80

- I've submitted a PR that changes the single line in the macro so it has the correct offsets
- <https://github.com/sPHENIX-Collaboration/macros/pull/694>
- This will fix the simulation geometry
 - This is a band-aid for a large systemic problem,
 - Which is that key alignment parameters are specified twice over
- Tony is investigating this afternoon (10/31)
 - He plans on running 1k or so pion events with a fixed random seed
 - The check is if the hit/cluster positions are the same whether initialization parameters are specified in the macro or not
 - (Barring the known issue with the phi offsets)

- I've submitted a PR that changes the single line in the macro so it has the correct offsets
- <https://github.com/sPHENIX-Collaboration/macros/pull/694>
- I'll likely need to edit it based on Tony's findings for the other parameters the macro is capable of overriding