



Weekly Report

July 10 - July 18

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Monte_carlo.py

Used Argparse to enable user input on the Bash script (learned from EvtClean.py)

Event_iterator function to keep track of the process (EvtClean.py)

Write each event's Monte Carlo fitting results onto a h5 file - multiple try/except commands so that the program can print out which part of the event went wrong while not disturbing other events

What is working right now?

The python code

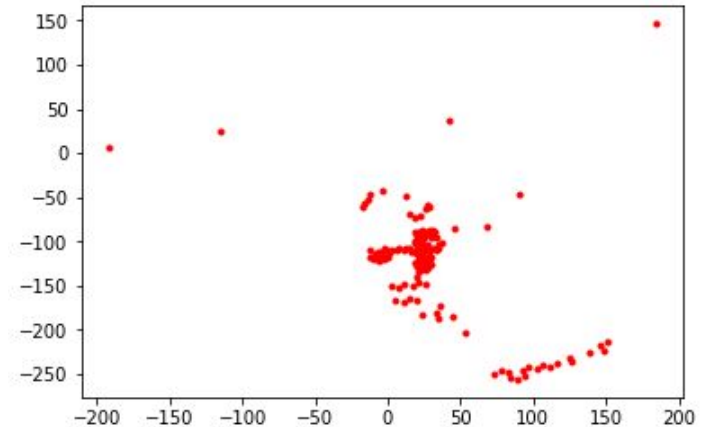
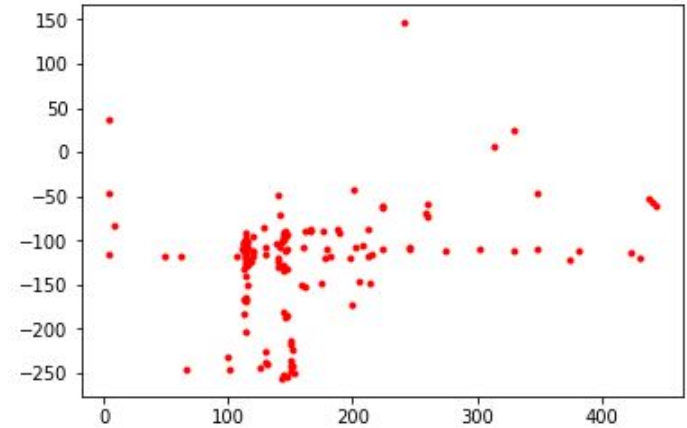
The bash script with designated path to a certain run (would finish processing only a limited #of events in the allotted time)

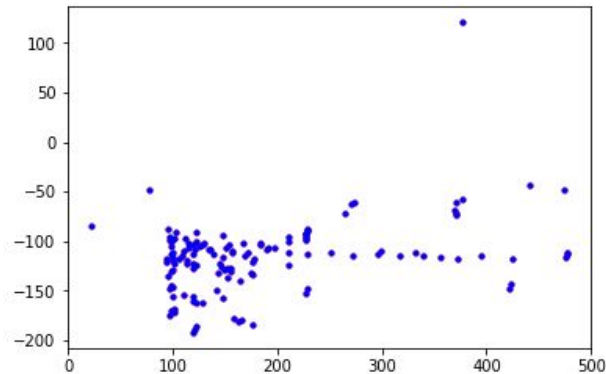
The bash script with PBS commands for both one run and multiple runs as a form of a job array - normally to process a run needs more than 10 hours so the job was usually killed before the output file can be released

How to improve the running
time?

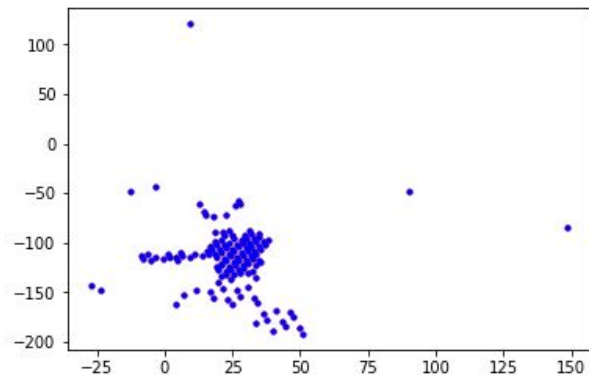
Is there a way to get rid of the total noisy events?

When the distance between data points and the center of vertex is less than 300mm (which is a loose criteria comparing to 150mm we used for cutting noise), the data will be deleted (red), and the blue points are kept





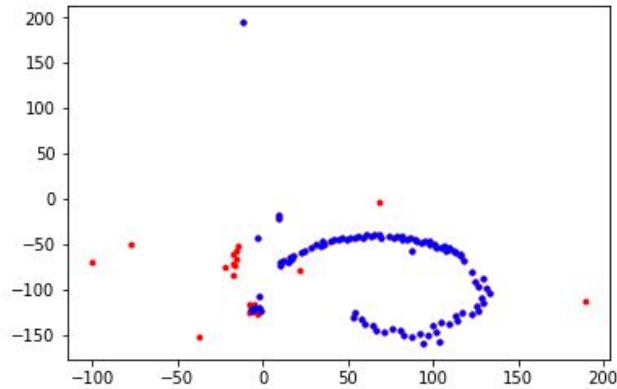
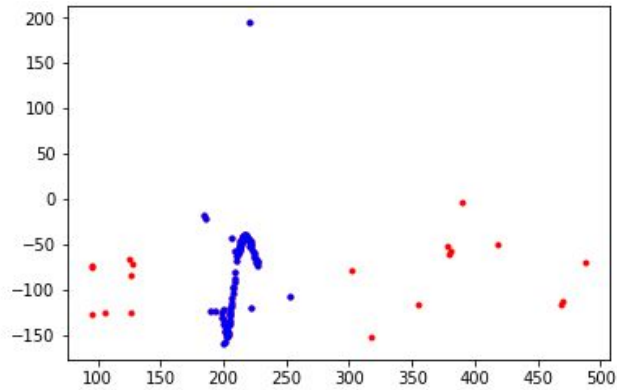
There is a great difference between fitting times for noisy data and leaned data, which i think could be the key to reducing the running time



However, some seemingly noisy data points were kept (blue)

Monte Carlo event 25 with noise: 6.398433446884155 seconds
 position chi2: 40.429346496557415 energy chi2: 10.734540225759497 vertex χ^2 : 4.116055919955087 total chi2: 55.279942642272
 Monte Carlo event 25 without noise: 0.004106044769287109 seconds
 position chi2: 40.91653057684259 energy chi2: 8.429408095912793 vertex χ^2 : 5.843173526918265 total chi2: 55.189112199673644

The proton events were kept



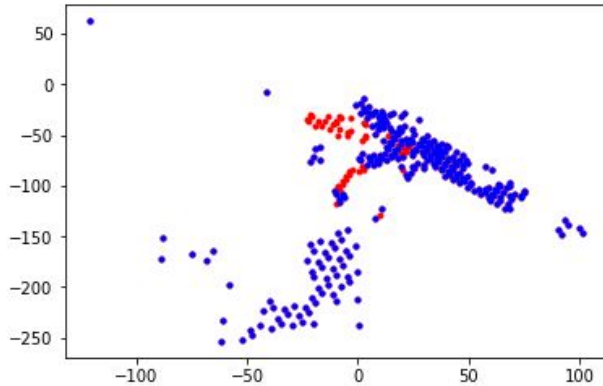
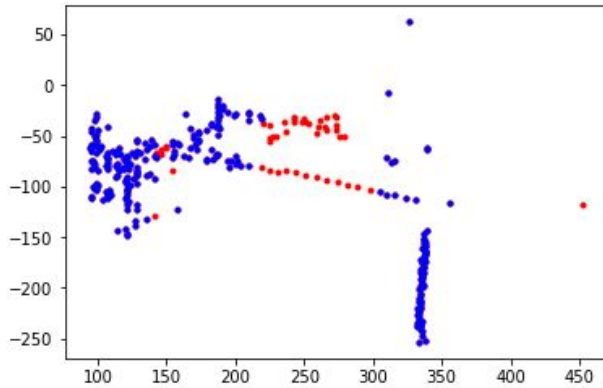
Monte Carlo event 22 with noise: 3.3545570373535156 seconds

position chi2: 69.87104346161969 energy chi2: 5.03323325941875 vertex χ^2 : 0.0014947120336555385 total chi2: 74.9057714330721

Monte Carlo event 22 without noise: 0.004172086715698242 seconds

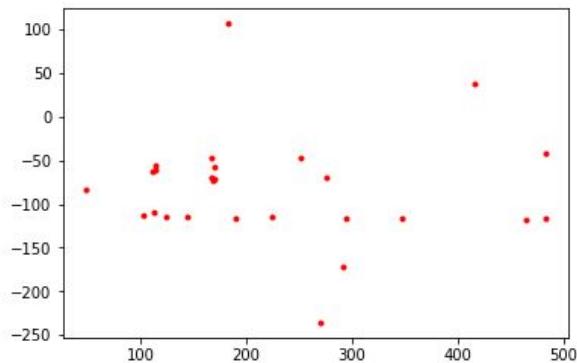
position chi2: 12.335112557278215 energy chi2: 9.976280991366055 vertex χ^2 : 2.356934868932885 total chi2: 24.668328417577154

The carbon (?) events were kept
also

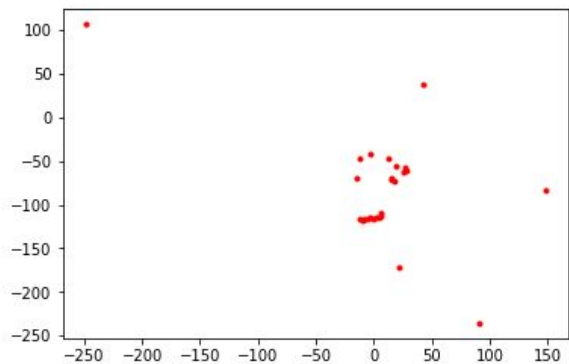


Monte Carlo event 0 with noise: 1.7752275466918945 seconds
position chi2: 85.58985121097759 energy chi2: 17.217299355116655 vertex chi²: 0.23453131066877084 total chi2: 103.041681
87676301

Monte Carlo event 0 without noise: 0.004266023635864258 seconds
position chi2: 78.79030629803553 energy chi2: 19.446045441360173 vertex chi²: 0.16884383045912457 total chi2: 98.4051955
6985483



The purely noisy data will raise runtime error and thus be eliminated from the fitting process



Monte Carlo event 17 with noise: 1.1515319347381592 seconds
position chi2: 79.13613678182234 energy chi2: 13.108878522393802 vertex χ^2 : 1.3000642739206656 total chi2: 93.54507957
813681
event 17 had runtime error

```
/home/chen/anaconda3/lib/python3.6/site-packages/scipy/odr/odrpak.py:857: OdrWarning: Empty data detected for ODR instance. Do not expect any fitting to occur  
OdrWarning)
```

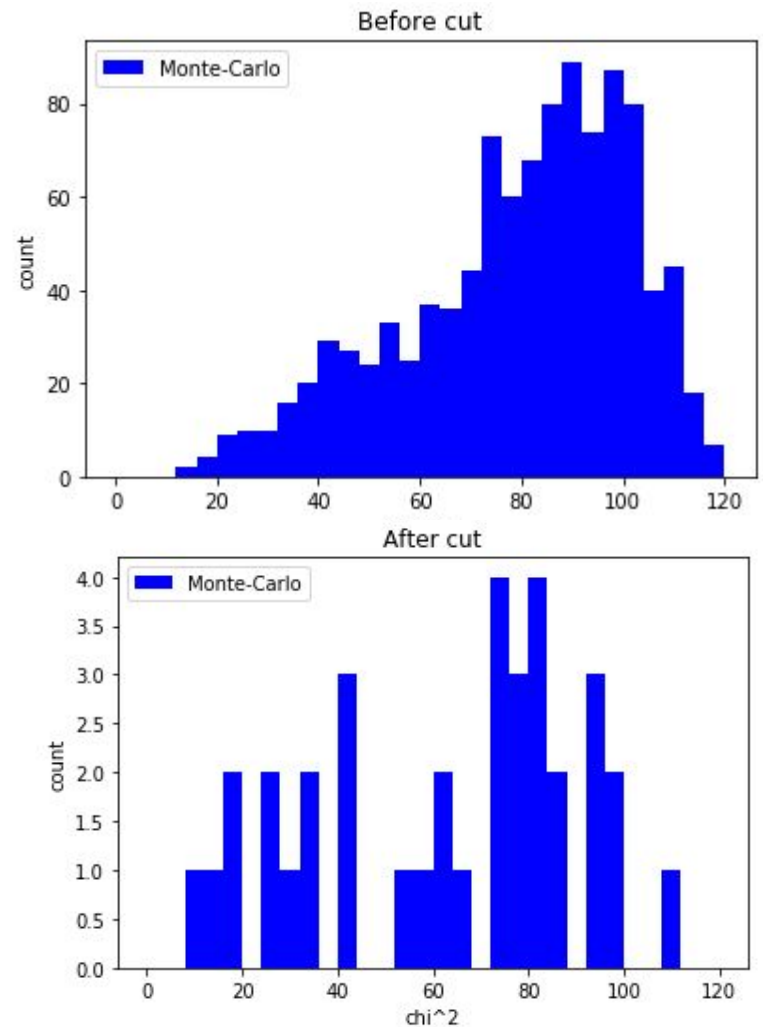
Results

We chose run_0215 because it had less number of events

It was run two times, one without the 300mm cut and one with the cut. Unfortunately the number of clean events left for the run was very little (36/1465)

Some of the events (even before the cut) encountered runtime error and thus failing their MC fitting - 1216/1465 was processed

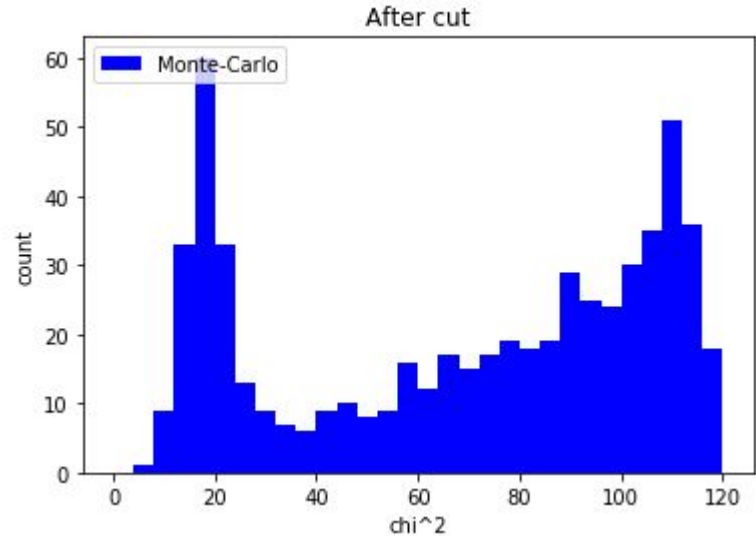
of events: 1465
of events successfully processed: 1216
of clean events successfully processed: 36



We then chose run_0118, which only had 1157 events.

The clean data's fitting took significantly longer time because more less-noisy events were kept

I have not had the chance to fit the whole run without cut seeing it would take a much longer time



of events: 1157

of clean events successfully processed: 609

However, with fatter runs like run_120.h5 that had over 70,000 events, even after the cleaning process it still took more than 10 hours to fit (my hpc job was eventually killed before it could be completed)